

AN INVESTIGATION OF CONFIRMATORY BIAS IN AN
AUDIT SETTING: A CONCEPTUALIZATION
AND LABORATORY EXPERIMENT

BY

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Abstract of Dissertation Proposal Presented to the Graduate
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Chairman: Douglas Snowball
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A laboratory experiment was conducted to (1) investigate the occurrence of confirmatory bias and (2) explore the cognitive mechanisms underlying auditors' judgments. A theoretical model was developed in which the conditions likely to lead to confirmatory bias were identified. One particular condition, commitment, was examined in the present study. Experimentally, subjects were required to allocate audit effort between two transaction cycles that were characterized as potential problem areas: the sales and receivables cycle and the purchases and payables cycle. Next, subjects were asked to select one of these cycles as being the most likely source for an unexpected fluctuation in gross margin. Subjects who were committed to their hypotheses were required to prepare a written memorandum justifying their selections of a particular cycle. Subjects who were not committed

were not required to prepare this written justification. Subsequently, subjects were presented with several pieces of audit evidence and then asked to make another allocation of audit effort between the two cycles. Lastly, a debriefing questionnaire was administered in which subjects were asked to recall evidence and rate the importance of this evidence. Subjects who were committed to their hypotheses were expected to show signs of confirmatory bias. They were expected to allocate more subsequent audit effort to the cycle selected than subjects who were not committed. The results for the occurrence of confirmatory bias were mixed. Subjects who selected the purchases and payables cycle (and were committed to that cycle) exhibited confirmatory bias. Subjects who selected the sales and receivables cycle did not show signs of the bias; however, this finding may have been due to a ceiling effect. Recall and importance measures were used to assess the underlying mechanisms. These findings were also mixed. Subjects recalled the same amount of confirming and disconfirming evidence, regardless of the cycle selected or level of commitment; however, problems with this measure were evident. In general, subjects assigned more importance to evidence uncovered in the sales and receivables cycle than the purchases and payables cycle. Only subjects who were committed to the purchases and payables cycle did not follow this pattern.

CHAPTER I

INTRODUCTION

External auditors are hired to attest to the fairness of a client's financial-statement presentation. In particular, they are required to conduct various audit tasks such that an opinion can be formed as to the fairness of this presentation. The objective is for this opinion to reflect the true state of the client. If the opinion does not reflect this true state, auditors may be held liable at common law or under the federal securities laws. Accordingly, the audit firm has an incentive to issue an accurate and unbiased opinion.

An accurate and unbiased opinion requires that audit tasks are conducted relatively free of judgmental biases. Felix and Kinney (1982) have identified several audit tasks where these biases may arise (e.g., compliance tests of pertinent controls and substantive tests of transactions and balances). However, these tasks concern the physical nature of the audit and, as such, their identification does not shed insight into "how" biases may occur. An alternative view of opinion formulation focuses upon information-processing tasks. Five processing tasks that may be associated with opinion formulation are hypothesis generation, information search, information interpretation, audit judgment, and audit decision. An examination of these tasks may provide

insight into the cognitive processes that lead to a judgment and, hence, into "how" biases occur. The presumption is that understanding "how" biases occur is essential if researchers are to develop decision aids that minimize suboptimal responses.

This study focuses primarily on two of the five information-processing tasks associated with opinion formulation: hypothesis generation and information interpretation. The broad proposition is that in the evaluation of information, individuals may exhibit a tendency to interpret cues consistently with previously generated hypotheses. This tendency is referred to as confirmatory bias.

Statement of the Problem

Confirmatory bias has been found in a variety of experimental settings. The findings are fairly consistent in that subjects (1) fail to consider alternative hypotheses and/or (a) ignore or explain away disconfirming information. Despite the apparent pervasiveness of the phenomenon of confirmatory bias, it does not necessarily follow that auditors must be susceptible to this bias. In particular, professional standards mandate an attitude of skepticism (AICPA, 1983, section 327.06). This attitude suggests that auditors should not accept findings at face value but rather should question test results and seek alternative explanations. The assumption is that auditors should remain open minded in information search and interpretation. However, other factors may override the auditor's mandated skepticism ("open mindedness"). Specifically, motivational and cognitive factors (to be discussed at some length in Chapter II) may affect auditor judgmental

processes and, in turn, lead to a closed-minded approach. To the extent that "closed mindedness" results, there is an increased likelihood that confirmatory bias will occur. The possibility that confirmatory bias affects judgmental processes of external auditors warrants research attention.

The external auditor constantly generates and tests specific hypotheses in the process of assessing one general hypothesis (that a client's true state is fairly represented by the respective financial statements). Confirmatory bias suggests that audit evidence may be interpreted consistently with initially generated hypotheses, even though alternative interpretations may be more plausible. In this sense, biased interpretation may lead to a suboptimal response.

Confirmatory bias may introduce ineffectiveness and/or inefficiency in the opinion-formulation process. It may result in unjustified audit opinions (ineffectiveness), in that the audit opinion does not reflect an existing divergence between the client's true state and the respective financial statements. Confirmatory bias also may result in inefficient audits, whereby auditors maintain incorrect hypotheses longer than is justified given the diagnosticity of the evidence uncovered. Consequently, the likelihood that confirmatory bias affects external auditors' judgments should be investigated.

Scope of the Dissertation

A laboratory experiment was conducted to assess the nature of confirmatory bias in audit settings. In conjunction, the cognitive mechanisms underlying auditors' judgments were explored. This

investigation of cognitive mechanisms provides an extension of the previous literature. Early auditing research on judgmental biases (Gibbins, 1977; Uecker and Kinney, 1977; Joyce and Biddle, 1981a; 1981b; and Kinney and Uecker, 1982) adopted the black-box approach. That is, researchers conducted tests of the existence or nonexistence of particular biases without investigating the causal, cognitive mechanisms that produce them. The present study differs from the earlier research by seeking causal explanations (in terms of cognitive mechanisms) for specific judgments.

The purpose of this study, therefore, is to provide insight into (1) the existence or nonexistence of confirmatory bias in audit settings and (2) the cognitive mechanisms that underlie various audit judgments. As a result, this study is descriptive in nature. Such descriptive research facilitates the establishment and implementation of normative (optimal) models of judgment. In particular, the identification of suboptimal processes by descriptive research ultimately may lead to the development of decision aids to correct for them.

Organization of the Dissertation

The remainder of the dissertation is organized into five chapters. Chapter II presents the relevant prior research, a general theoretical model, and specific research hypotheses. The prior research serves as a foundation for the development of the theoretical model. The model characterizes the occurrence of confirmatory bias and, as such, identifies (1) certain conditions that may lead to the bias and (2) cognitive mechanisms that may underlie judgments when these conditions

are present. Elements of this model are used to draw specific research hypotheses. The laboratory experiment undertaken to test the hypotheses is described in considerable detail (encompassing descriptions of the design, subjects, procedure, and the task) in Chapter III. Chapter IV presents the analysis and the results of the study. The chapter also relates the results to the research hypotheses. Chapter V presents a summary of the results, discusses the implications of these results, highlights the limitations inherent in the methodology, and provides suggestions for future research.

CHAPTER II

RELATED LITERATURE, THEORETICAL MODEL, AND RESEARCH HYPOTHESES

Confirmatory bias has been examined in a variety of experimental settings, and for the most part, the findings of previous research have indicated that the bias does occur. The research has provided limited structure (for an exception see Fischhoff and Beyth-Marom, 1983), however, as to "when" and "how" the bias occurs, and an objective of this chapter is to provide such a structure. The chapter presents a theoretical model which was developed using prior research as a foundation. The model provides the basis for discussion of (1) the conditions that are likely to lead to confirmatory bias and (2) the processes that are likely to underlie confirmatory bias. Specific research hypotheses are formulated from this model.

The chapter is organized into five sections. First, an overview of the bias is presented. The second section discusses the performance of information-processing tasks and identifies certain conditions that may bias the performance of these tasks. This section provides an understanding of "when" confirmatory bias occurs. The third and fourth sections present a more detailed examination of those phases of processing tasks (information search and information interpretation) in which the bias is likely to arise. The emphasis of these two sections is on providing an understanding of "how" confirmatory bias occurs. The

final section summarizes the general model and identifies specific elements that are used to draw the research hypotheses. The hypotheses are also formally stated in this section.

An Overview of Confirmatory Bias

Confirmatory bias results from a predisposition to confirm rather than disconfirm. Individual inquiry is biased toward the fulfillment of expectations (Deighton, 1983). Schustack and Sternberg (1981) have suggested that the bias affects (1) the particular information to which individuals attend and (2) the interpretation applied to this particular information. In other words, confirmatory bias may arise in both information search and information interpretation. Only the latter context is examined empirically in this study. Bias originating in information search is considered beyond the scope of the study and is not examined directly. Nevertheless, both processing tasks are discussed in the development of the theoretical model, in order to provide a more complete framework for the current study and for future research in the area.

In the first case, confirmatory bias may arise in the task of information search. Individuals may formulate hypotheses and then search for information that confirms these hypotheses, while ignoring information that disconfirms them. Einhorn and Hogarth (1978) concluded that individuals have more difficulty handling disconfirming information than confirming information. Apparently, less cognitive effort is associated with the latter. Bruner et al. (1956) similarly argued that individuals are more ready or more prepared to search for information

that confirms a hypothesis. This type of search strategy allows for direct tests of existing hypotheses, whereas alternative (disconfirming) search strategies only allow for indirect tests. Hoch (1984) suggests that judgmental habits are likely to be based on the former.

In the second case, confirmatory bias may arise in the task of information interpretation. Individuals may tend to interpret information consistently with their hypotheses rather than inconsistently. Bruner (1957) suggested that individual hypotheses establish a basis for information interpretation. Individual's attempt to produce a "fit" between existing hypotheses and attended information, and this may lead to a biased interpretation of disconfirming information. The information may be discounted or assimilated toward existing hypotheses. The argument proposed by Bruner et al. (1956) for information search can also be extended to information interpretation. Individuals are simply more ready or more prepared to interpret information consistently with their hypotheses. In this sense, inconsistent (disconfirming) interpretations of information are not as likely to be considered.

In both cases discussed above, motivational and/or cognitive factors are likely to underlie confirmatory bias. Individuals may want to confirm their hypotheses and/or they may be more ready to confirm them. The next three sections of this chapter discuss these factors and how they lead to confirmatory bias. The related literature (theoretical and empirical) is also discussed.

Conditions Leading to Confirmatory Bias

Confirmatory bias arises when individuals exhibit "closed mindedness" in information search and/or interpretation. The presence of "closed mindedness" may be due to motivational and/or cognitive factors. In addition, situational factors may heighten the effects of these factors and, hence, indirectly influence the presence of "closed mindedness." When "closed mindedness" is indeed present, it reduces or constrains an individual's readiness for search and/or interpretation. The entire process is depicted in Figure 1, which provides a framework for the discussion below.

Motivational Factors

The relationship between individual motivations and "closed mindedness" has been addressed frequently within the psychological literature. In particular, two competing motives or tendencies are identified within this literature: consonance and curiosity. Consonance stems from cognitive-consistency theory and suggests "closed mindedness." Festinger (1957) has asserted that individuals strive to maintain a consonance or consistency among the various elements of their cognitive systems. Inconsistent cognitions arouse an unpleasant psychological state, and as a result, behavior is designed to achieve consistency--which is psychologically pleasing. Consistent cognitions also serve to enhance individual "self image" (Aronson, 1976). McGuire (1966, p. 37) has indicated that "an individual motivated by consonance will have a penchant for stability, redundancy, familiarity, confirmation of expectations, and avoidance of the new and the

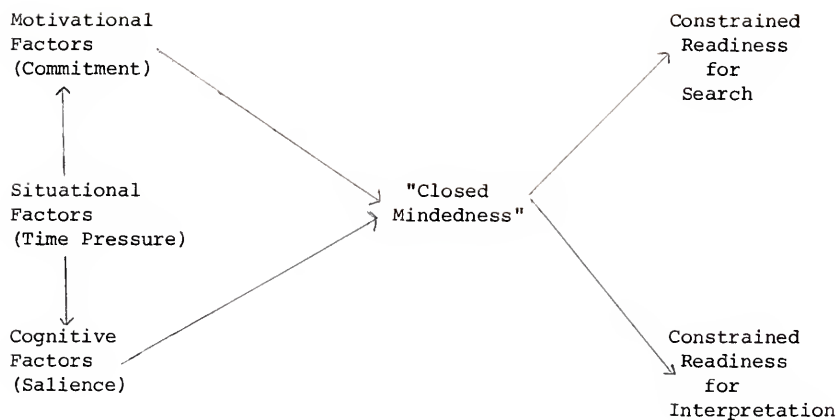


Figure 1: Conditions that Lead to Confirmatory Bias

unpredictable." In short, such individuals desire a structured and ordered picture of the world.

Curiosity, on the other hand, suggests "open mindedness" and is the focus of cognitive-complexity theory. Berlyne (1960) has asserted that individuals display exploratory behavior to attain an understanding of the unknown and the unpredictable. This type of behavior is likely to arise from a low level of arousal, i.e., boredom. McGuire (1966, p.37) has asserted that "an individual motivated by curiosity takes pleasure in the unexpected, wants to experience everything, shows alternation behavior, and finds novelty rewarding."

Specific factors may affect an individual's motive to act. "Closed mindedness" is likely to occur when an individual's motive for consonance is heightened. Commitment (defined by Kiesler, 1971, as a psychological state that creates a resistance to cognitive change) is an example of a factor that leads to a heightening of this motive (see Bazerman et al., 1984). Individuals who are committed are likely to feel a need to justify their positions both to themselves and to others (Staw, 1981). Internal justification is necessary for cognitive consistency (Festinger, 1957; Aronson, 1976). External justification is necessary for an appearance of competence (Fox and Staw, 1979). Individuals who publicly support (or commit to) particular positions are less likely to subsequently withdraw their support for fear of public embarrassment, an unpleasant psychological state. These individuals are more likely to advocate their chosen positions and view these positions favorably in terms of the surrounding environment.

Cognitive Factors

Figure 1 indicates that cognitive factors also may lead to "closed mindedness." These factors involve the accessibility of specific items from long-term memory (LTM). Items that are accessed are initially activated. Activation is a state of excitation (achieved either consciously or unconsciously) that diminishes over time. It is necessary but not sufficient for the accessibility of particular items. The state of excitation is triggered by environmental cues such that items associated with these cues are likely to be remembered. The likelihood that an item will be activated and subsequently accessed may be directly affected by the recency and frequency with which it has been accessed previously. Items that have been accessed recently may still be activated, and as such they may be relatively easy to access: the association between these items and environmental cues is at a heightened level because of recent access. Repeated activation also serves to strengthen the association between certain items and environmental cues. Items that have been accessed frequently then may be relatively easy to activate. As a result, individuals may display static tendencies. They may not adequately adapt to new situations and, hence, may exhibit "closed mindedness"--in the form of a bias towards items accessed recently and frequently.

The salience of an item also may affect LTM accessibility. Salience is defined as the prominence or conspicuousness associated with a particular item. Salience strengthens the association between a particular item and environmental cues. Tversky and Kahneman (1973; 1974) indicated that individuals are more likely to access salient

events than non-salient ones. Taylor et al. (1979) concluded that salience effects are highly generalizable. Consequently, "closed mindedness" may follow--in the form of a bias towards items that are salient. Similarity and cognitive effort are two other factors that may affect LTM accessibility and increase the likelihood that items will be accessed which are consistent with expectations. A cue that appears similar to an expectancy-consistent cue is likely to be interpreted in that manner, even though in fact it may not be similar (Bruner, 1957). This interpretation is more readily accessible than an alternative one, and as such, it requires less cognitive effort (Einhorn and Hogarth, 1978). Items that are consistent with expectations are likely to be activated when a specific expectation is formed. A strong association is likely to exist between these items and expectations. In contrast, inconsistent items are not as likely to be activated since the association between these items and expectations is likely to be weak. These items require more cognitive effort to access. As a result, individuals may exhibit "closed mindedness" in the form of a bias towards items that are expectancy-consistent.

Situational Factors

Situational factors may have an impact on motivational and/or cognitive factors such that "closed mindedness" follows. In particular, these factors may heighten an individual's motive for consonance and/or restrict LTM accessibility. Situations where task demands exceed individual capabilities are likely to produce these effects. Time pressure is an example of a factor that may lead to excess task demands.

An individual may be motivated to simplify a situation in order to reach a quick solution, and this simplification may involve an increased awareness of expectancy-consistent cues and a decreased awareness of expectancy-inconsistent cues. In addition, time pressures may serve to heighten the accessibility of specific items from LTM, i.e., expectancy-consistent items. These items typically allow for the fastest and most direct test of existing hypotheses. As such, "closed mindedness" is likely to follow.

Factors Affecting the Auditor

Biased judgments are likely to follow to the extent that "closed mindedness" results. As shown in Figure 1, commitment, salience, and time pressure are specific factors that may lead to "closed mindedness" and, hence, may have an impact on judgments, including those made by auditors. From a psychological perspective, the effects associated with these factors are likely to be pervasive. From an auditing perspective, the effects associated with these factors may surface or they may be mitigated by professional training. Although the end result is an empirical question, plausible scenarios may be construed where these factors have adverse (undesirable) effects on the audit process. The possibility of an undesirable outcome (inefficiency and/or third-party litigation) underlies the need to examine the relationship between factors leading to "closed mindedness" and the audit process.

Commitment to a hypothesis may result in "closed mindedness" through an effect on auditor motivations. In particular, if auditors are required to disclose their hypotheses to others (especially

supervisors) before specific audit work is conducted, they may have increased incentives to maintain these hypotheses. Fox and Staw (1979) have found that individuals feel a need to justify actions disclosed to others. This need only serves to heighten incentives to maintain the correctness of previous actions (or a reluctance to change one's position). For auditors, these incentives may be heightened further by the performance-evaluation process, since how quickly auditors identify problem areas may directly affect evaluations of performance. As a result, auditors may want to believe in the correctness of their initial hypotheses, and they may be reluctant to reject these hypotheses.

The salience of a hypothesis may lead to "closed mindedness" through an effect on the specific audit areas that are perceived as potential problems. In an audit investigation, some areas are more likely to "stand out" and fall under closer inspection than others. For example, areas that have been focal points of recent court cases should be very salient. Areas where the auditor has observed major discrepancies in other audits should also be very salient. Auditors may unwittingly focus their scope of investigation in these salient areas, even though the evidence strictly may not justify that focus.

Situational factors, particularly time pressures, may lead to "closed mindedness" through an effect on auditor motivations and/or the recognition of potential problem areas. They may generally heighten the effects of the motivational and cognitive aspects associated with information evaluation. Time pressures may be such that auditors operate in a setting where task demands exceed individual capabilities. Accordingly, quick, simple, and viable solutions may be sought.

Auditors may be motivated to seek the most efficient, but not necessarily the most effective, solutions. As such, these motivations may lead to a reduction in the auditor's scope of investigation.

Time pressures also are likely to affect the specific audit areas that are viewed as potential problems. Libby (1984) found that the likelihood auditors will investigate particular areas is affected by the recency and frequency associated with discrepancies that have been uncovered in these areas. Time pressures serve to heighten this likelihood. That is, auditors may limit their areas of investigation to those areas that have been examined only very recently and/or very frequently. Therefore, the auditor's scope of investigation may be focused in these areas.

Constrained Readiness for Search and Interpretation

"Closed mindedness" increases the likelihood that confirmatory bias will occur. Specifically, it leads to a constrained readiness for search and a constrained readiness for interpretation, as shown in Figure 1. These states of readiness reflect the motivational and cognitive factors discussed above. In particular, these states will have an impact on what hypotheses are generated, what information cues are uncovered, what information cues are attended, and what information interpretations are provided. When "closed mindedness" is present, the likelihood is increased that fewer and more focused hypotheses will be generated; information cues will be searched and attended to that are consistent with (confirm) these hypotheses; and that information will tend to be interpreted in a fashion consistent with these hypotheses.

Information Search

Information search is defined as the task of actively seeking evidence to formulate hypotheses or test hypotheses. This task is affected by hypothesis generation and readiness for search. The information-search process is presented in Figure 2. Although information search is not examined directly in the present study, a discussion is included to provide a more complete framework for understanding confirmatory bias.

Initially, search is undertaken or hypotheses are generated. No predictions are made as to which courses of action will be taken. Little empirical evidence is available and a priori reasoning does not lead to any strong expectations. Whatever the course taken, the end result is that hypotheses will be generated, as shown in Figure 2. Information search that is undertaken initially (preliminary search) is affected by readiness for search. Readiness for search determines the specific types of cues that are attended. This readiness may be constrained as the result of motivational and/or cognitive factors.

Hoch (1984) has suggested that individuals prefer information framed in terms of positive instances rather than negative ones. Positive instances allow for direct tests of hypotheses, whereas negative instances allow for indirect tests. Individuals are likely to have had much more practical experience with direct tests rather than indirect tests. Hoch (1984) presents the example of a husband who asserts that he knows the kinds of clothes his wife likes. The husband is not likely to test this belief indirectly by buying his wife clothes that he thinks she will dislike. To maintain marital harmony, he will

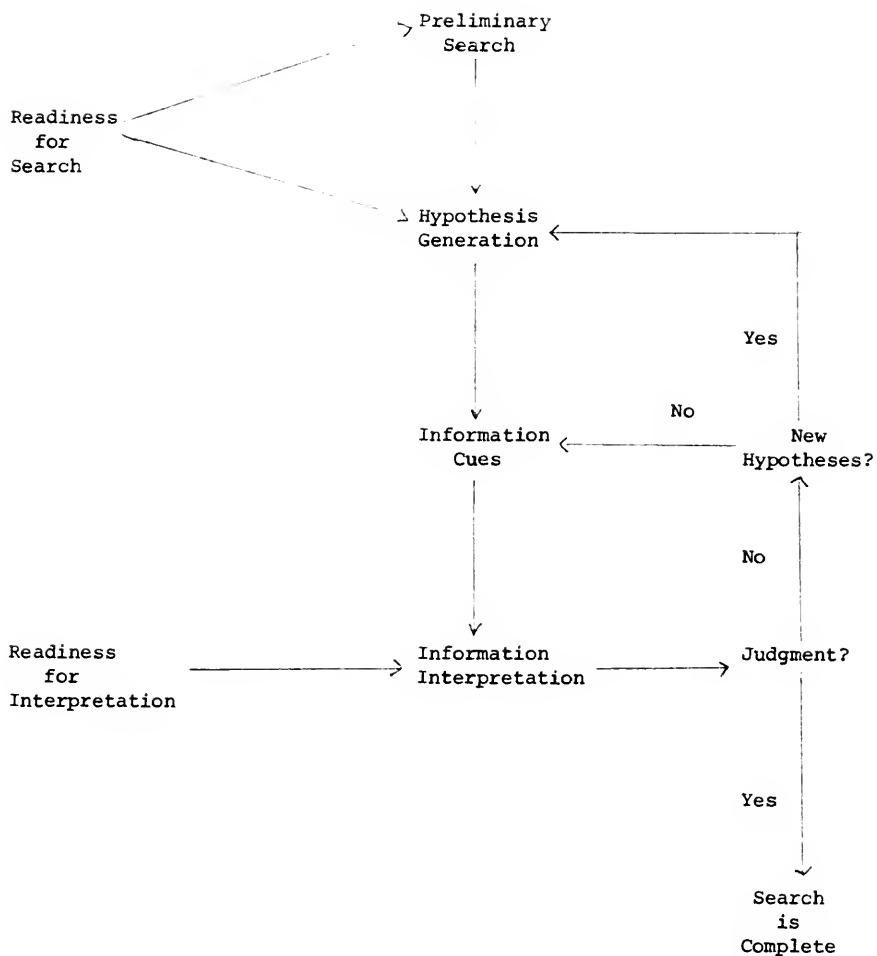


Figure 2: Information Search

buy her clothes that he thinks she will like, which is a direct test of the belief. For practical reasons, instances that lead to direct tests may be much more accessible than instances that lead to indirect tests and as such readiness for search may be constrained. If readiness for search is constrained, fewer types of cues are attended.

If hypothesis generation is undertaken initially, it is also affected by readiness for search, as shown in Figure 2. In particular, this readiness determines the specific hypotheses generated: the number of hypotheses and the focus of these hypotheses. If this readiness is constrained, hypothesis generation will be restricted.

After hypothesis generation is completed, information search is undertaken. Figure 2 indicates that this task involves seeking out various information cues. Previous research (Wason, 1960; 1968; Mynatt et al., 1977; 1978; Snyder and Swann, 1978; and Snyder and Campbell, 1980) has found that in certain situations, search is likely to be biased towards uncovering cues that are consistent with initial hypotheses. In this sense, confirmatory bias may originate in information search.

Subsequent to encountering information cues, they are interpreted. At this point, search activity either continues or it is completed. Figure 2 indicates that if search continues, additional information cues may be sought or hypothesis generation may be undertaken again. In the former, search is still directed towards the initial hypothesis. In the latter, this direction is changed or modified (not shown in Figure 2).

If this direction is changed, new hypotheses will be accessed, initial hypotheses rejected, and subsequent search will not be a

function of these initial hypotheses. In contrast, if the direction of search is modified, old hypotheses will be reformulated, not necessarily rejected, and subsequent search will be some function of these old hypotheses. In this case, search will be focused in a specified area such that confirmatory bias may still be likely to arise in this processing task. Subsequently, the processes discussed above may be repeated until search is completed or abandoned.

Empirical Studies of Information Search

Empirical studies of information search generally involve one of two tasks. In one case, subjects are required to complete a logical problem. They are asked to verify a rule or determine a rule that underlies a set of instances. In a second case, subjects are required to test hypotheses about other people or firms. Both types of studies are reviewed below.

Logical-Problem Tasks

In an early study, Wason (1960) presented subjects with a task described as structurally simple but deceptively difficult. Subjects were required to determine the rule that accounted for the numerical sequence 2-4-6. The correct rule was simply three ascending numbers. While some subjects guessed this rule immediately, others became fixated on their initial choices and took much longer. These results may be driven by the association between the rule initially accessed and the correct rule. The association between two similar rules is likely to be

much stronger than that between two dissimilar rules. Subjects who guessed the correct rule quickly may have activated this rule or a similar rule at a very early stage. As such, these subjects may have had little difficulty activating and subsequently accessing the correct rule. Subjects who took much longer, on the other hand, may have initially activated an incorrect rule that was dissimilar (to the correct rule). In this case, these subjects may have had problems activating the correct rule, which would account for why they took much longer to guess this rule.

Wason (1968) presented a similar task in which subjects were required to select the necessary instances to verify the truth of a given rule. The results were almost identical to those reported in the earlier study (Wason, 1960). Mynatt, Doherty and Tweney (1977; 1978) extended Wason (1960) with a much more complex task. The results, however, did not change. The results of these studies also may be driven by the association between the rule initially accessed and the correct rule.

Finally, Hoch and Tschirgi (1983) found that task performance could be improved (search could be made more efficient) if concrete (thematic) rather than abstract (symbolic) materials were presented. Earlier studies used primarily abstract materials. The use of concrete materials should enable subjects to associate the experimental task with mundane experiences. Such experiences are likely to be stored in LTM, whereas abstract rules usually must be inferred. Instances that are

stored are generally easier (less cognitive effort is involved) to activate than instances that are inferred. Consequently, the use of concrete materials is likely to improve task performance.

Although the findings in this area suggest that subjects have a tendency to follow a confirmatory strategy, most of the studies discussed employed abstract tasks. The results of the study by Hoch and Tschirgi (1983) indicate that this tendency may be diminished when the task is framed in mundane terms. In other words, subjects may perform more efficiently and/or effectively in the real world than in an artificial, experimental setting. The reason is that subjects have more experience with the former than the latter. With an abstract task, subjects are likely to follow a strategy that involves less cognitive effort, which suggests a confirmatory strategy.

Testing Hypotheses About Others

Snyder and Swann (1978) required subjects to formulate question-asking strategies to assess the extraversion or introversion (one was specified) of a target person. Subjects selected 12 of 26 questions from a list provided by the experimenters. This list included questions framed in terms of confirming, disconfirming, and neutral instances. The main finding was that subjects showed a definite preference for confirming questions over both disconfirming and neutral ones. Snyder and Campbell (1980) repeated this study with a slight variation and found similar results. In both studies, subjects employed direct tests of hypotheses: they searched for positive, confirming instances. Although the results suggest that subjects followed a

confirming strategy, these findings also suggest that subjects followed a strategy consistent with judgmental habit. A strategy consistent with judgmental habit is one that allows individuals to adapt satisfactorily (without adverse consequences) to the environment.

Trope and Bassok (1982) provided another extension of the study by Snyder and Swann (1978). They presented subjects with two hypotheses, instead of one, and asked them to assess both hypotheses. Subjects did not show a preference for attending to confirming information. These results may have been driven by the fact that the two hypotheses were made salient. Subjects may have employed a direct test for each hypothesis. While subjects attended to information that disconfirmed a particular hypothesis, this information also confirmed the alternative hypothesis. Subjects may have searched for information that confirmed each hypothesis.

Lastly, Kida (1984) extended Snyder and Swann (1978) in an audit setting. Audit partners and managers investigated the going-concern status of an hypothetical firm. One half of the subjects were asked to determine if this firm would remain viable for two more years. The other half were asked to determine if this firm would fail within two years. The results were mixed. Subjects who assessed failure attended primarily to confirming information, whereas subjects who assessed viability attended to both confirming and disconfirming information. However, the consequences are associated with a negative outcome (loan default) are more severe than those associated with a positive outcome. A question of going-concern status is inherently framed as a failure question to protect against a negative outcome. This hypothesis is

salient even when it is not presented. Consequently, a confirming strategy was followed in the failure condition and not in the viability condition.

The findings in this area suggest that subjects seek information that is consistent with salient hypotheses. In each of the studies discussed, one or more hypothesis was presented and, consequently, made salient by the experimenter. However, other hypotheses also may have been salient if subjects had experience with the task. Personal experience may have caused the activation and subsequent access of hypotheses that were not presented. As such, personal experience may account for the mixed results that have been uncovered as to the occurrence of confirmatory bias. That is, the bias has been found to occur only when one hypothesis is salient and not otherwise.

Information Interpretation

Information interpretation is defined as the task of assigning meaning to specific information cues. This task is affected by readiness for interpretation and the particular information cues encountered in search. That is, individuals are more ready or more prepared to interpret some information cues than others. The information-interpretation process is presented in Figure 3, which provides a general overview for the discussion below.

Figure 3 indicates that readiness for interpretation will affect "how" specific information cues are interpreted. These interpretations will tend to be biased when this readiness is constrained and unbiased otherwise. If interpretation is biased, the processing of disconfirming

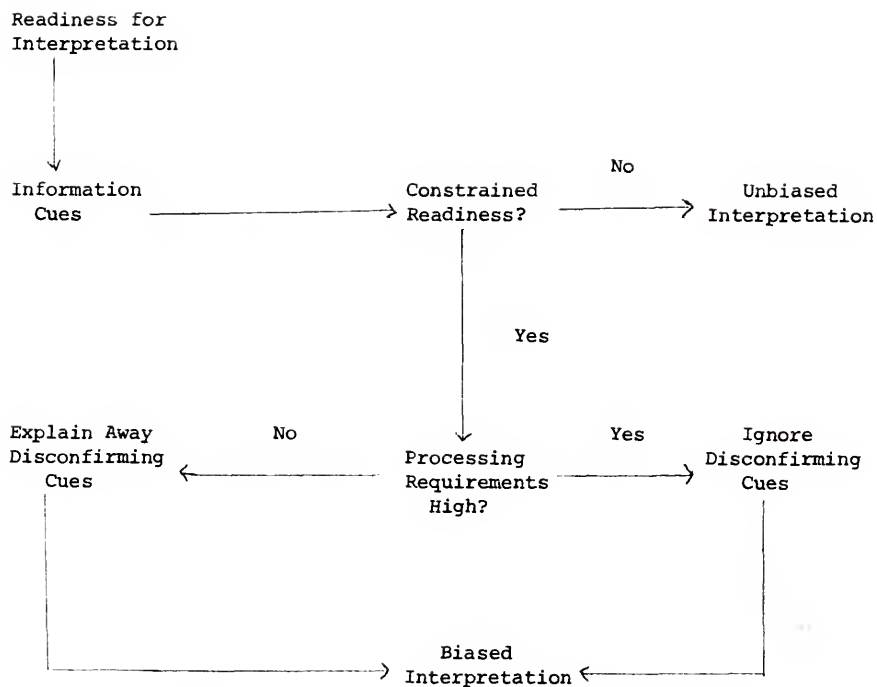


Figure 3: Information Interpretation

cues will be affected. In particular, these cues will be ignored or explained away depending upon the processing requirements of the situation. As shown in Figure 3, disconfirming cues will be ignored when these requirements are high and explained away otherwise. Whichever processing phenomenon occurs, confirmatory bias is likely to result.

The cognitive mechanisms that may underlie the bias include selective processing, situational attribution, and biased assimilation. The former involves ignoring disconfirming cues while the latter two involve explaining away these cues.

Selective Processing

Selective processing occurs when disconfirming cues are ignored or overlooked in information interpretation. These cues are weighted with a factor of zero. The mechanism should arise when processing requirements are stringent and readiness for interpretation is constrained. Individuals are likely to restructure situations where processing requirements are high (Bruner et al., 1956; Elstein et al., 1978) in order to reduce task demands. That is, the mechanism provides for a simplification in processing (disconfirming cues are not processed) and enables individuals to satisfactorily cope with the situation. Wright (1974) found that subjects attended to less information when processing requirements were high. In this sense, selective processing is a mechanism that provides for restructuring.

Situational Attribution

Situational attribution is a cognitive mechanism by which disconfirming cues are explained away. Under situational attribution, the apparent inconsistency associated with these cues is recognized and, subsequently, attributed to various other factors. These cues are discounted, and their negative impact is significantly reduced. Motivational factors are likely to lead to this processing mechanism. That is, individuals desire or want to explain away disconfirming cues. The mechanism is more likely to be employed when processing requirements are not high (task demands do not exceed individual capabilities) and readiness for interpretation is constrained.

If disconfirming cues are explained away as discussed above, they are likely to be processed at a deeper level than confirming cues. Level of processing refers to the degree of elaboration in interpretation, where greater "depth" implies a greater degree of semantic or cognitive analysis (Craik and Lockhart, 1972, p. 675). Disconfirming cues likely require further elaboration (by comparison to confirming cues) in order to explain the apparent inconsistency between them and existing hypotheses. This further elaboration suggests that disconfirming cues may take longer to process than confirming cues (Hastie and Kumar, 1979; and Hastie, 1980). As such, situational attribution is not expected to be employed when processing requirements are restrictive.

Biased Assimilation

Biased assimilation is another cognitive mechanism by which disconfirming cues are explained away. In this case, however, the apparent inconsistency associated with the disconfirming cues is not fully recognized or appreciated. Instead, these cues are (1) viewed as unimportant (neutral) or (2) assimilated to fit existing hypotheses. In either case, specific cues are not interpreted as being inconsistent with expectations. Cognitive factors are likely to lead to this processing mechanism. That is, individuals are less likely to activate and subsequently access inconsistent interpretations. The mechanism is most likely to be used when processing requirements are not high and readiness for interpretation is constrained.

If disconfirming cues are explained away without a recognition of their apparent inconsistency, they are likely to be processed at a similar level to that of confirming cues. In fact, these cues may be processed as if they are confirming cues. Although these assimilated cues will serve to support expectations, they will not provide a basis for these expectations. Since these cues will provide weak rather than strong support for expectations, they are less likely to be examined when processing requirements are high.

Empirical Studies of Information Interpretation

Empirical studies of information interpretation are reviewed below. These studies are divided into two categories: studies where disconfirming cues are ignored and studies where these cues are explained away.

Ignoring Disconfirming Cues

Information interpretation may involve a selective processing of cues consistent with initial hypotheses. In this case, selectivity is likely to produce a biased (superior) recall of confirming cues. Zadny and Gerard (1974) conducted a study to test this hypothesis. Subjects were given an expectation and asked to watch a skit. Subsequently, they were asked to recall facts presented in the skit. The authors found that subjects recalled significantly more expectancy-consistent (confirming) facts than expectancy-inconsistent (disconfirming) facts. Subjects were likely to have activated characteristics associated with their expectations when these expectations were formulated (presented). When expectancy-consistent cues were encountered, subjects were likely to have matched these cues with their expectations. In the subsequent recall task, subjects' expectations were likely to have cued expectancy-consistent items, and as such, these items were more likely to be recalled than expectancy-inconsistent items.

Rothbart et al. (1979) performed a similar study. However, one half of the subjects were given an expectation before information was presented, whereas the other half were given an expectation after information was presented. Recall was superior for expectancy-consistent cues only in the before condition. Subjects in the before condition were likely to have matched expectancy-consistent cues with their expectations when these cues were encountered. Subjects in the after condition, on the other hand, were likely to have processed all

cues in a similar manner since they were not initially given an expectation. Consequently, the findings suggest that selectivity occurs in encoding rather than recall.

Other studies (i.e., Srull, 1980; Hastie, 1980) have found superior recall for unexpected or novel information. Unexpected information, however, is not necessarily disconfirming. These cues may simply appear novel and unrelated, and as such, they may stand out (the cues may be salient). In addition, the presence of some disconfirming cues may actually be expected. Individuals may anticipate that a certain position will not be supported completely by the evidence (exceptions may be expected).

Hastie and Kumar (1979) found that subjects recalled unexpected cues at least as well as expected cues. However, subjects were initially told that a recall task would be administered. This may have increased their awareness and their level of processing of unexpected (and negative) cues. Zadny and Gerard (1974) and Rothbart et al. (1979) did not inform subjects that recall would be tested. Additionally, Hastie and Kumar found an inverse relationship between the accuracy of recall and the number of disconfirming cues that were presented. But decreasing the number of disconfirming cues should increase their novelty, which in turn should heighten the conspicuousness associated with these cues. As a result, recall of disconfirming cues should improve as these cues become more novel.

The findings in this area suggest that expectations may lead to an encoding bias, which may affect the processing and subsequent recall of information cues. In particular, expectancy-consistent cues may be the

focus of attention, whereas expectancy-inconsistent cues may be overlooked. Expectancy-consistent cues are likely to be matched with existing expectations, and this matching is likely to facilitate the activation and subsequent access of these cues. That is, the expectation triggers activation which enhance the likelihood of accessibility. In conjunction, although novel and/or unexpected cues are not likely to be matched with expectations, these cues may stand out due to their nature. As such, they may be processed at a deeper level than otherwise bland and unimportant cues. A greater depth of processing suggests that these cues are further elaborated, which increases the number of cues that are associated with these cues. Consequently, the likelihood that these cues will be activated and subsequently accessed is increased.

Explaining Away Disconfirming Cues

Individuals may explain away disconfirming cues such that the inconsistency associated with these cues is reduced or eliminated. Hayden and Mischel (1976) presented subjects with information that was both consistent and inconsistent with initial expectations. Subsequently, subjects' interpretations of this information were elicited. The authors found that subjects either (1) treated inconsistent information as actually being consistent or (2) dismissed this information as unimportant. Disconfirming information was explained away. Subjects were likely to have activated characteristics associated with their expectations when expectations were formulated. They may have matched information subsequently encountered with their

expectations. Subjects' expectations were likely to have guided information interpretation. Simply put, inconsistent interpretations were not as likely to have been activated as consistent interpretations. Moreover, subjects may have been motivated to interpret information consistently with their expectations. Staw (1981) has asserted that individuals perceive consistent behavior much more favorably than inconsistent behavior. Subjects may have been motivated to present a consistent picture of themselves to the experimenter.

Elstein et al. (1978) investigated a range of medical tasks in which physicians were required to diagnose the condition of hypothetical patients. The results showed that physicians generated hypotheses early and tended to explain away evidence that contradicted these hypotheses. In this case, motivational factors may have driven the results. Subjects may have felt committed to their initial hypotheses. After all, subjects performed tasks at which they were experts. They may have felt a need to maintain their hypotheses in order to exhibit professional competence to the experimenter. Consequently disconfirming evidence was explained away.

Lord et al. (1979) conducted a study to assess individual attitudes on capital punishment. Subjects were presented with information that both supported and opposed capital punishment. The authors found that subjects tended to accept information that was consistent with their attitudes and reject information that was inconsistent. Again, motivational factors may have driven the results. Capital punishment may be perceived as an emotional issue, and in general, such issues are likely to evoke strong feelings. Individuals who had strong beliefs

(either pro or con) about capital punishment were recruited to participate in the study. These individuals were likely to have been committed to their beliefs. Subjects may have felt a need to interpret information consistently with existing attitudes in order to justify (maintain cognitive consistency) their beliefs to themselves.

Lastly, Darley and Gross (1983) showed subjects a videotape of a child taking an academic test. The authors labeled this child as being from either a "high" or "low" socioeconomic background. After viewing the tape, subjects were given an evaluation form to complete. The child labeled as coming from a high socioeconomic background was rated above her grade level, whereas the child labeled as coming from a low socioeconomic background was rated below her grade level. Subjects also cited evidence to support their conclusions. In particular, subjects exposed to the "high" background label indicated that the child answered more questions correctly, exhibited more instances of positive behavior, and took a more difficult test than subjects exposed to the "low" background level. Subjects were likely to have activated characteristics associated with the label that was presented. That label was likely to have guided information interpretation. Subjects may have been more likely to access consistent interpretations than inconsistent ones. As such, cognitive factors may have driven the results.

The findings in this area suggest that subjects may have a tendency to dismiss disconfirming information. These findings may be driven by motivational and/or cognitive factors. Subjects may have felt compelled to attribute inconsistent information to factors that were not relevant

to existing expectations. Alternatively, subjects may have been more likely to activate and subsequently access consistent interpretations than inconsistent interpretations.

Formulation of the Hypotheses

Specific research hypotheses are drawn from elements of the model presented above. A test of the entire model is beyond the scope of the dissertation. The present study is restricted to examining the effect that commitment has on information interpretation. The broad proposition is that this factor induces individuals to interpret information consistently with existing hypotheses.

Before the research hypotheses are presented, the theoretical model is briefly summarized. The model must be clearly understood at this point in order to follow the development of the hypotheses. The decision to investigate certain elements of the model is also discussed. This discussion provides a justification for inclusion of these elements in the study. Then, the research hypotheses are developed and formally stated.

Summary of the Model

A theoretical model was developed to explain the occurrence of confirmatory bias. Motivational and/or cognitive factors are likely to underlie the bias. In particular, these factors may lead to "closed mindedness," which establishes a necessary condition for the occurrence of the bias. "Closed mindedness," in turn, leads to a constrained readiness for search and interpretation. This constrained readiness serves to focus what information cues are attended and how these cues

are interpreted. As a result, confirmatory bias may arise in information search or information interpretation.

Confirmatory bias arises in information search as a tendency for individuals to seek information cues that are consistent with existing hypotheses rather than inconsistent. This type of strategy provides a direct test of hypotheses. From a practical standpoint, individuals usually have more experience with direct tests than indirect tests. The empirical evidence in this area indicates that individuals search in a focused (confirming) direction when (1) alternative hypotheses are not apparent (cognitive factor) and/or (2) alternative hypotheses are not preferred or desired (motivational factor).

Confirmatory bias arises in information interpretation as a tendency for individuals to interpret information cues consistently. In this case, the bias affects how disconfirming cues are processed. These cues will be ignored or overlooked when processing requirements are high. Otherwise, these cues will be explained away. Disconfirming cues may be discounted (the inconsistency associated with these cues is reduced) or assimilated to fit existing hypotheses (the inconsistency associated with these cues is eliminated). The empirical evidence in this area indicates that individuals ignore or explain away disconfirming cues when (1) alternative interpretations are not apparent (cognitive factor) and/or (2) alternative interpretations are not preferred or desired (motivational factor).

Elements Relevant to the Study

The present study investigates the proposition that commitment to a hypothesis leads to confirmatory bias arising in information interpretation. Commitment was defined earlier as a psychological state that establishes a reluctance to change one's position. Wicklund and Brehm (1976) suggest that commitment leads to a motive for consonance as long as responsibility can be assigned for particular actions or judgments. In other words, responsibility provides for a crucial link between commitment to a hypothesis and "closed mindedness." The authors further assert that responsibility encompasses two components: choice and foreseeability. In particular, (1) individuals are free to choose particular actions or judgments and (2) the consequences associated with these actions or judgments are (or hindsight indicates that they should be) reasonably foreseeable.

Responsibility can be readily assigned in the audit environment simply by examining work papers. Included in a client's work papers are (1) the audit procedures applied, (2) the tests performed, (3) the information obtained, and (4) the pertinent conclusions reached in the engagement (AICPA, 1983, section 339.03). These papers also allow for the evaluation of an auditor's performance. In fact, professional standards require a critical review of work performed and conclusions drawn at every level of supervision (AICPA, 1983, section 210.05). As a result, audit judgments are publicly disclosed and subject to examination. These conditions are likely to induce commitment to one's judgment or position.

Choice and foreseeability are also implicit in the audit environment as underlying components of responsibility. Although audit procedures may be somewhat constrained, judgments are usually left to the auditor's discretion. For the most part, the auditor is free to interpret evidence as desired. In conjunction, the consequences associated with judgments may be reasonably foreseeable. The structure of an audit is such that foreseeability is likely to follow. The audit process is so interrelated that in many cases particular judgments dictate certain consequences. Hence, choice and foreseeability may facilitate a feeling of responsibility, which in turn may lead to commitment.

Commitment may affect information search and/or information interpretation such that confirmatory bias results. Although both tasks assume important roles in the audit process, the present study focuses on information interpretation. This processing task may be particularly pertinent in light of existing audit technology. The inclusion of decision aids in the audit program may sufficiently limit (on a routine basis) the extent of search decisions that must be made. These aids may structure and direct (restrict choice in) information search more than information interpretation. Confirmatory search has been examined to some degree in Libby (1984), while confirmatory interpretation has not been addressed empirically in an auditing context. As such, this study seeks to provide a foundation for explaining confirmatory bias that arises in information interpretation (in an auditing context).

Research Hypotheses

Three specific research hypotheses are developed in the discussion that follows. The first hypothesis is concerned with the general occurrence of confirmatory bias. The second hypothesis posits a relationship between the occurrence of the bias and specific behavior. The third hypothesis concerns the cognitive mechanisms underlying auditors' judgments.

Individuals who are committed to their hypotheses are more likely to interpret information consistently with these hypotheses than individuals who are not committed. Commitment to a hypothesis leads to "closed mindedness" which is likely to affect information interpretation. For individuals who are committed, inconsistent information threatens existing hypotheses and creates unease--the resulting psychological state is unpleasant. These individuals are likely to have an intrinsic want or desire to confirm their hypotheses. They may even go to great lengths (blatantly biased interpretation) to dismiss inconsistent information. The findings in Lord et al. (1979) and Elstein et al. (1978) may be attributed to commitment. In both studies, subjects interpreted information as being largely consistent with their hypotheses regardless of the nature of the information (consistent or inconsistent). Subjects in Lord et al. (1979) were likely to have been committed to their preexisting attitudes, and subjects in Elstein et al. (1978) were likely to have been committed to their expert diagnoses.

Auditors may also be susceptible to the effects of commitment. As discussed earlier, this factor is likely to be present in an audit

setting. Audit judgments are fully documented and subject to review. As a result, auditors are likely to feel responsible for their judgments. This feeling of responsibility, in turn, is likely to lead to commitment. Auditors may be compelled to maintain their positions. They may bias their interpretations of inconsistent evidence. Formally, the research hypothesis is

H1: Auditors who are committed to their hypotheses are more likely to interpret evidence consistently with these hypotheses than auditors who are not committed.

When the information to be attended to is prescribed, individuals who are committed to their hypotheses are likely to show a preference for examining potentially confirming information before other information, whereas individuals who are not committed are not likely to show any preference. Individuals who are committed have a greater need to confirm their hypotheses than individuals who are not committed. They are more likely to seek supportive (confirming) information as opposed to any other information. Although individuals do not actually know if an information cue is confirming until it has been examined, they are likely to seek cues that are expected to be (potentially) confirming. Elstein et al. (1978) have found such search behavior using experienced internists as subjects. In that study, subjects were likely to have been committed to their diagnoses and, as such, searched primarily for information that would confirm these diagnoses.

Commitment may also have an effect on search when search is prescribed. In the case of prescribed search, the particular information cues to be attended to are predetermined (or designated). Individuals have no control over the information that is encountered;

however, they may control the sequence in which it is encountered.

Individuals who are committed may initially avoid potentially disconfirming information for fear that they have chosen a totally inappropriate position. Therefore, these individuals are more likely to examine potentially confirming information before examining potentially disconfirming or neutral information. Confirming information is likely to bolster existing hypotheses and strengthen individual positions. Individuals who are committed are likely to feel less restrained about examining potentially disconfirming information after potentially confirming information has been examined. In contrast, individuals who are not committed are not likely to have an intrinsic need to confirm their hypotheses, and as such, they are not likely to show a preference for the sequence in which information is examined.

Prescribed search may be particularly relevant in the present audit environment. The inclusion of decision aids in the audit program may largely constrain information search: the direction of search (the specific cues to be examined) may be prescribed. As discussed above, the presence of commitment is likely to influence the sequence in which evidence is examined and interpreted (assuming that information is interpreted at the time that it is attended). The research hypothesis is

- H2: When search is prescribed, auditors who are committed to their hypotheses are likely to show a preference for examining potentially confirming evidence before other evidence, whereas auditors who are not committed are not likely to show a preference.

Individuals who are committed to their hypotheses are more likely to discount disconfirming information than individuals who are not

committed. Situational attribution is the underlying cognitive mechanism when disconfirming information is discounted. Individuals who are committed to their hypotheses have a need to explain away disconfirming information, although they are not blind to this information. In other words, the inconsistency associated with disconfirming information (and existing hypotheses) is recognized and considered. The presence of commitment is likely to compel individuals to dismiss (explain away) this inconsistency: the inconsistency is likely to be attributed to a factor that is not relevant to the decision at hand. The empirical literature has provided little direct evidence as to the cognitive mechanisms underlying confirmatory bias, although the findings in Lord et al. (1979) and Elstein et al. (1978) may be explained by a process of discounting disconfirming information. The results in both studies indicate that disconfirming information was likely to have been explained away, but the particular mechanism underlying this process was not assessed. Other research (i.e., Hayden and Mischel, 1976; Darley and Gross, 1983) simply has investigated the occurrence of confirmatory bias (this was the stated purpose) without making a distinction between the factors (cognitive and motivational) that drive the bias. Nonetheless, commitment is likely to trigger situational attribution as an underlying cognitive mechanism.

Auditors who are committed to their hypotheses are also likely to discount disconfirming evidence. The ability to discount this evidence is necessary for auditors to justify their positions. Gibbins (1984) has reported that auditors feel a need to be able to justify their

positions. The presence of commitment only serves to heighten this need. Formally, the research hypothesis is

- H3: Auditors who are committed to their hypotheses are more likely to discount disconfirming evidence than auditors who are not committed.

CHAPTER III

RESEARCH METHODOLOGY

A laboratory experiment was conducted to test the specific research hypotheses developed in Chapter II. Simply put, the study investigates the proposition that in auditing contexts, a motivational factor (commitment) may lead to confirmatory bias arising in information interpretation. Specifically, auditors who are committed to their hypotheses may be more likely to interpret evidence consistently with these hypotheses than auditors who are not committed. The cognitive mechanisms that underlie auditors' judgments are also explored.

External auditors participated in the study. They were asked to complete a three-part task involving audit planning and internal control. The primary part of the task required subjects to formulate and assess a hypothesis about a potential problem area. Subjects were allowed to select one of two hypotheses. Subjects in the commitment group were required to justify their selections, while subjects in the noncommitment group were not required to provide justifications. Subsequently, all subjects were asked to examine several pieces of audit evidence in light of their hypotheses. The evidence presented was not conclusive about the problem area. Subjects then were asked to make a final assessment concerning their hypotheses. The extent to which final

assessments favored subjects' hypotheses was used as an indicator of the occurrence of confirmatory bias.

The remainder of this chapter is organized into five sections. The experimental design subjects, procedure, and task employed are discussed in the first four sections. The specific (operational) variables used to assess the research hypotheses are identified in the final section.

Experimental Design

A 2x2 factorial design was used. The two independent variables were the priming of a hypothesis and level of commitment. The priming of a hypothesis is a subtle method used to increase the salience of that hypothesis. All treatment subjects were primed for one of two hypotheses, where each hypothesis was identified as a potential problem area. Subjects were required to select one of these hypotheses as being the most likely source for an unexpected fluctuation in gross margin. The manipulation was intended to induce subjects to select the hypothesis that had been primed. The generalizability of the study is enhanced if a reasonable number of subjects select each hypothesis. A control group was also included, where subjects were not primed for a possible hypothesis. This group would allow for a comparison between primed and unprimed subjects.

The commitment variable was the primary variable of interest. A high level of commitment should lead to a reluctance to reject one's position. One half of the treatment subjects were included in a commitment (COM) group and the other half were included in a noncommitment (NCOM) group. Subjects in the COM group were required to

prepare a written justification indicating why they selected a particular hypothesis. Subjects in the NCOM group were not required to prepare this justification.

Subjects

The managing partners from sixteen public accounting offices agreed to assist in obtaining subjects for this study. The offices represented six Big Eight and two local firms throughout Florida. Subjects with a minimum of one year's audit experience were requested. Although subjects were required to assume the role of an audit senior, the task judgments were rather straightforward. The feeling was that experienced staff personnel would be familiar with these judgments, and as such, they were included in the sample.

Seventy-nine practicing external auditors took part in this study. Their audit experience ranged from three months to 7.50 years, with an average of 2.48 years. Seventy-five subjects had at least one year's audit experience, and fifty-eight subjects had received professional certification.

Procedure

Arrangements were made with the managing partners of the participating offices for coordination of the task. In all cases, the task was administered at specific firm offices. It was administered to subjects in groups of two to six and took approximately 40 minutes to complete.

In terms of procedure, subjects at each office were gathered and taken to an enclosed area. Subjects initially were asked to write their

names on a sheet of paper that was passed around. They were told that their names were being collected for the researcher's personnel records; however, knowledge of individual names was necessary for the commitment manipulation (discussed further below). Next, the task materials were distributed. Subjects were asked to complete two booklets. They were informed that the second booklet would not be passed out until the first one had been completed.

Subsequently, a brief, verbal introduction to the task was given. Subjects were told that the objective of the study was to obtain information as to how various judgments are made that affect audit planning and internal control. In addition, they were informed that different versions of the task had been distributed. They were told of these differences in very general terms ("tasks are similar but not identical") to eliminate any possible confusion. Confusion may have arisen if subjects had not been informed of these general differences, but noticed that their tasks were not the same as other subjects' tasks. However, specific differences (what each manipulation entailed) were not likely to be apparent and, as such, demand characteristics of the experiment should have been unaffected. Finally, subjects were thanked and told to begin.

Task

The experimental task consisted of three parts. In part one, subjects were primed for a particular hypothesis. In part two, a hypothetical case setting was presented. In the final part, subjects

were asked to complete a debriefing questionnaire. All three parts are discussed below.

Initially, subjects were presented with internal-control information for a particular transaction cycle. This information was very general and did not relate to any specific firm. Pretests indicated that specific information may lead to serious demand effects. The same information was presented in three different forms (see Appendix A): a narrative form, a checklist form, and a grouped (by internal-control strengths and weaknesses) form. Subjects were asked to indicate which form they preferred. Subjects were also asked to evaluate the overall strength of the internal-control system. This evaluation was included to ensure that subjects read the content of the information presented as opposed to simply examining the form. The content was intended to prime a particular hypothesis, and as such, it needed to be read. The priming procedure was very subtle; however, pretests indicated that a subtle prime was necessary, otherwise subjects were likely to see right through the procedure. The content of the prime was also manipulated (see Appendices A, B, and C). One half of the treatment subjects received information about the sales and receivables cycle (SRC), while the other half received information about the purchases and payables cycle (PPC). In both cases, the prime was intended to affect the subsequent selection of a hypothesis. Subjects in the control group received information about the payroll and personnel cycle. This cycle did not represent a possible hypothesis and, as a result, should not have affected the subsequent selection. At this point, part one of the task was completed.

In part two, subjects were asked to play the role of an audit senior (see Appendices D and E). They were provided with background information on a hypothetical client. In particular, they were told that the client had had noncompliance problems with several internal controls. These problems had occurred primarily in the SRC and the PPC. In addition, subjects were informed that a total of 100 man hours had been budgeted for the investigation of these two cycles. They were asked to allocate the total number of hours between the two cycles; however, subjects were told that the alternatives were limited to the following allocation schemes:

65% PPC	60% PPC	55% PPC	50% PPC	55% SRC	60% SRC	65% SRC
35% SRC	40% SRC	45% SRC	50% SRC	45% PPC	40% PPC	35% PPC

These alternative allocation schemes captured the responses of nearly 90% of (pretest) subjects who performed the task without any constraints (that is, could allocate hours in anyway desired). The primary reason for constraining the choice of allocation schemes in the main experiment was that subjects had relatively little firm-specific information to use as a basis for their allocations. A secondary reason for this constraint was to prevent subjects from choosing a very extreme allocation scheme (more than 65% for one cycle and less than 35% for the other cycle). The choice of such an allocation scheme would virtually prohibit a finding of confirmatory bias, given the experimental task. However, the selection of a very extreme allocation scheme should not be expected realistically (given all the facts) when assigning hours between the SRC and the PPC--both cycles are important. The allocation schemes selected were taken as a measure of subjects' prior beliefs.

Subjects were informed that an unexpected fluctuation in gross margin had been uncovered during preliminary analytical review. They were told that their objective should be to determine the source of this fluctuation. Subjects were asked to indicate which of the two specified areas, SRC or PPC, was more likely to underlie the fluctuation. Subjects' choices were used as a basis for identifying their hypotheses. After completing this procedure, subjects then returned the materials to the experimenter in exchange for materials presented in a second booklet.

At this time, commitment was manipulated. Subjects in the commitment group were asked to prepare a written memo explaining why they selected a particular cycle as being the most likely source for the unexpected fluctuation in gross margin. They were told that their explanations would be discussed, at a later date, with representatives from their firms or offices (as part of a second research project). To induce commitment, each subject's name and firm affiliation appeared at the top of the page on which subjects wrote their explanation. Names and affiliations had been handwritten by the experimenter while the subjects were working with the first booklet. Commitment is likely to arise since subjects are overtly taking a position which is to be reviewed by their peers. Subjects in the noncommitment groups were not required to prepare a written memo, and their names and firm affiliations were not included on the second booklet.

All subjects had been provided with a large envelope labeled "Other Materials" and a plastic container at the beginning of the task. Subjects were informed that the large envelope contained ten small

envelopes relating to compliance-test results for ten internal-control improvements that had been adopted by management. In particular, four improvements had been made in the SRC, four in the PPC, and two in the payroll and personnel cycle (PYC). Nonstatistical sampling had been conducted to assess the reliability of these controls. Each sampling result was included in a small envelope labeled by the control being tested. Subjects were instructed to open the large envelope and examine the sampling results one at a time. They were told that the sampling results could be examined in any order, but that they could not refer back to earlier sampling results. Subjects were instructed to place each small envelope in the plastic container after the result had been examined. This container was used to maintain the order that sampling results were examined. The order that each result was attended could not be mixed up after it was placed in this container.

The sampling results that were used in the task are presented in Table 1. Each result is referred to as an information cue. The SRC and PPC cues should be relevant for uncovering the source of the unexpected fluctuation in gross margin. The PYC cues should be irrelevant or neutral. Exceptions in the SRC or the PPC may have a direct affect on gross margin, whereas exceptions in the PYC will not have such an effect. The SRC and PPC cues were also symmetrical. That is, the tests conducted in each cycle and the corresponding sample sizes and exception rates were the same. A careful examination of Table 1 reveals this symmetry. Since the cues were symmetrical, they should not have given a clear indication as to the source of the unexpected fluctuation. The cues were intended to be inconclusive.

TABLE 1: Compliance Tests and Sampling Results

1. Test: A sample of 60 sales invoices was examined for proper authorization.
Result: Four exceptions were found. These invoices were not approved in accordance with company policy.
2. Test: A numerical sequence of 40 sales invoices was examined to account for the integrity of this sequence.
Result: Two exceptions were found. In this case, duplicate sales invoices were uncovered.
3. Test: A sample of 50 sales invoices was examined for internal verification.
Result: One exception was found. This invoice was not initialled to ensure a proper recording in the sales journal.
4. Test: A sample of 70 shipping reports was examined for internal verification.
Result: Five exceptions were found. These reports were not initialled to ensure that the terms listed were the same as those listed on sales invoices.
5. Test: A sample of 60 purchase orders was examined for proper authorization.
Result: Four exceptions were found. These orders were not approved in accordance with company policy.
6. Test: A numerical sequence of 40 purchase orders was examined to account for the integrity of this sequence.
Result: Two exceptions were found. In this case, purchase orders were missing.
7. Test: A sample of 50 vendors' invoices was examined for internal verification.
Result: One exception was found. This invoice was not initialled to ensure a proper recording in the purchases journal.
8. Test: A sample of 70 purchase orders was examined for internal verification.
Result: Five exceptions were found. These orders were not initialled to ensure that the terms listed were the same as those listed on vendors' invoices.
9. Test: A sample of 40 time cards was examined for proper authorization.
Result: No exceptions were found.
10. Test: A sample of 60 payroll transactions was examined for internal verification.
Result: Seven exceptions were found. These transactions were not initialled to ensure that employees' earnings records were correct.

In terms of the analysis, the SRC and PPC cues were classified as confirming or disconfirming depending on the cycle selected as the most likely source for the unexpected fluctuation in gross margin. Cues that involved the same cycle as the one selected were classified as confirming and cues that involved the other cycle were classified as disconfirming. For example, if a subject selected the SRC then cues 1-4 from Table 1 were classified as confirming and cues 5-8 were classified as disconfirming. Cues 9 and 10 were always classified as neutral, regardless of the cycle selected.

After examining the sampling results, subjects were informed that an additional 20 man hours had been budgeted for further investigation of the SRC and the PPC. Pretests indicated that subjects perceived 20 additional hours as being appropriate for the investigation: the mean and median responses of pretest subjects were 21.6471 and 20.0000 hours, respectively. Subjects in the main study were told that the additional hours were budgeted as the result of a growing concern over the unexpected fluctuation in gross margin. They were asked to allocate these additional hours between the two cycles. Again, subjects were told that their supervisors would only approve certain allocations. The allocation schemes (and the underlying reasons for their use) were the same as presented earlier. The number of additional hours allocated to the cycle selected as the most likely source for the unexpected fluctuation ($20 \text{ hours} \times \% \text{ hours allocated to the cycle selected}$) was used as the primary dependent variable in the data analysis. At this point, the second part of the task was completed.

In part three, subjects were asked to complete a debriefing questionnaire (see Appendix F). The first few questions were intended to collect general information. After these questions had been answered, subjects were asked to indicate whether (1) more exceptions were uncovered in the SRC, (2) more exceptions were uncovered in the PPC, or (3) the same number of exceptions were uncovered in both cycles. The general impressions that subjects formulate as to the most likely source for the unexpected fluctuation in gross margin should be captured in their responses to this question. Next, ten cued-recall questions were presented. Subjects were given a list of the controls (improvements) that had been tested and asked to indicate the number of exceptions that were uncovered in each of the sampling results. The presentation of this list was reversed to allow for a test of a possible order effect (see Appendix G). Subjects also were asked to indicate their levels of confidence in these answers. These responses were given on a seven-point scale anchored by very low confidence and very high confidence.

Subsequently, subjects were asked to indicate how important each sampling result could have been in producing the unexpected fluctuation in gross margin. Again, they were given a list of the ten controls that had been tested and asked to respond. As with recall, the presentation of this list was reversed (see Appendix H). Subjects' responses were given on a seven-point scale anchored by extremely unimportant and extremely important.

Finally, subjects were asked to provide an allocation of the total 120 hours (the 100 originally budgeted plus the 20 additionally

allotted) given all the information available to them. These responses may provide insight into subjects' responses for additional hours. Again, subjects' responses were constrained to the seven allocation schemes.

Testing the Hypotheses

The research hypotheses are assessed in terms of the laboratory experiment described above. Commitment to a hypothesis was the primary independent variable. Subjects in the COM group were required to prepare a written memo justifying their selections of hypotheses. Subjects in the NCOM and control groups were not required to prepare a written justification. The particular dependent measures used to test the hypotheses are discussed below.

Research hypothesis one states that auditors who are committed to their hypotheses are more likely to interpret evidence consistently with these hypotheses than auditors who are not committed. The extent to which information cues were interpreted consistently with existing hypotheses was inferred from subjects' allocations of additional audit hours. Subjects who were committed to their hypotheses should have allocated more additional hours to the cycle selected than subjects who were not committed.

Research hypothesis two states that when search is prescribed, auditors who are committed to their hypotheses are likely to show a preference for interpreting confirming evidence before other evidence, whereas auditors who are not committed are not likely to show a preference. Subjects were required to examine ten information cues.

Eight cues were classified as confirming and disconfirming according to the cycle (hypothesis) selected by each subject. The other two cues were always classified as neutral. The sequence in which information cues were examined was determined by the order that sampling results (contained in small envelopes) were placed in the plastic container. Subjects who were committed to their hypotheses should have examined confirming cues before other cues, whereas subjects who were not committed should not have shown any preference for the sequence in which cues were examined.

Research hypothesis three states that auditors who are committed to their hypotheses are more likely to discount disconfirming evidence than auditors who are not committed. The cognitive mechanisms underlying subjects' judgments were inferred from their responses to recall and importance questions. Disconfirming evidence is elaborated and processed at a deeper level than confirming evidence when it is discounted (a motivational factor drives this process). In turn, the weight assigned to disconfirming evidence is reduced. Hastie (1980) and Hastie and Kumar (1979) have suggested that recall will be superior for information processed at a deeper level as compared to a shallower level. Subjects who were committed to their hypotheses should have recalled more disconfirming cues than subjects who were not committed. These subjects also should have assigned less importance to disconfirming evidence than subjects who were not committed.

CHAPTER IV

DATA ANALYSIS AND RESULTS

This chapter describes the analysis and presents the results of the study. The first section investigates the occurrence of confirmatory bias. The second section explores the cognitive mechanisms underlying auditors' judgments. Each of the sections explains the results in terms of the specific research hypotheses.

The Occurrence of Confirmatory Bias

Treatment subjects were primed for one of two hypotheses. The prime was intended to affect the cycle (hypothesis) selected by each subject. The dependent measures, however, were not expected to differ (between subjects) as a result of the cycle selected. Level of commitment was also manipulated. This manipulation was expected to affect (1) subjects' allocations of additional audit hours and (2) the sequence in which subjects examined and interpreted confirming and disconfirming cues. The remainder of the section is organized as follows: first the results of a manipulation check for the prime are presented; and then the findings for H1 and H2 are discussed.

Manipulation Check for the Prime

An extensive manipulation check was performed to determine the effect(s) of the prime. The success of this manipulation (inducing

subjects to select the cycle that had been primed) was assessed with a contingency table (Mendenhall et al., 1981, p. 564). A χ^2 statistic was computed and used to test for independence between the cycle primed and the cycle selected. The test results show that subjects selected hypotheses independently of the cycle that was primed (see Table 2). Subjects were not affected differently by the nature of the prime (SRC or PPC). A second contingency table was constructed and another χ^2 statistic computed to test for differences in the selection patterns of control (unprimed) subjects and treatment (primed) subjects. The results show no differences (see Table 3). The prime did not affect the cycle selected, and as a result, the manipulation was unsuccessful. This finding suggests that the cycle selected should be examined in subsequent analysis to test for differences between the SRC and the PPC.

TABLE 2

Contingency Table (Prime SRC vs PPC)

	Prime SRC	Prime PPC	Significance Level
Select SRC	12(11.6825)*	11(11.3175)	NS
Select PPC	20(20.3175)	20(19.6825)	

*Numbers in parentheses represent expected cell means.

TABLE 3

Contingency Table (Control vs Treatment)

	Control	Treatment	Significance Level
Select SRC	3(5.2658)*	23(20.7342)	NS
Select PPC	13(10.7342)	40(42.2658)	

*Numbers in parentheses represent expected cell means.

A chi-square goodness-of-fit test was also performed to determine if one hypothesis was more likely to be selected than the other hypothesis. The results show that subjects were more likely to select

the PPC than the SRC (see Table 4). This finding applies even though the same number of treatment subjects were primed for the PPC as the SRC.

TABLE 4

Chi-Square Goodness-of-Fit Test for Cycle Selected

	Select SRC	Select PPC	Significance Level
Observed Cell Frequencies	26	53	0.005
Expected Cell Frequencies	39.50	39.50	

Although the prime did not affect the cycle selected, it may have affected the allocation scheme chosen for originally budgeted hours. In fact, subjects were asked to choose this scheme before selecting a hypothesis. A one-way analysis of variance (ANOVA) was conducted to test for a main effect of the prime. The number of budgeted hours allocated to the cycle selected (BUDHRS) was used as the dependent variable. The following model was run on the treatment subjects:

$$y_{ij} = \mu + \alpha_i + \epsilon_{ij}$$

where

y_{ij} is the j th observed response (BUDHRS) for the i th level of the prime,

μ is the population mean,

α_i is the main effect of the i th level of the prime, and

ϵ_{ij} is the random error associated with the j th response.

The results show that the prime did not have an effect on subjects' responses for BUDHRS (see Table 5). Subjects who were primed for the SRC and the PPC then were collapsed into one group, and the analysis was

repeated for all subjects. This analysis allowed for a comparison between treatment (primed) subjects and control (unprimed) subjects. Once again, the results show that the prime did not have an effect (see Table 6).

TABLE 5

ANOVA for BUDHRS (n = 63)

Source	DF	SS	F value	PR > F
Prime	1	21.9038	0.28	0.5983
Error	61	4763.8105	-	-

$$R^2 = 0.0046$$

TABLE 6

ANOVA for BUDHRS (n = 79)

Source	DF	SS	F value	PR > F
Prime	1	121.0697	1.57	0.2143
Error	77	5946.6518	-	-

$$R^2 = 0.0200$$

As a precaution, the ANOVAs discussed above were run again with the number of additional hours allocated to the cycle selected (ADDHRS) as the dependent variable. The objective was to determine if the prime had an effect on subjects' responses for ADDHRS. The COM treatment subjects were excluded from the analysis. Their responses were expected to differ as a result of the commitment manipulation. First, the ANOVA was conducted for NCOM treatment subjects. No differences were found (see Table 7). As a result, these subjects were collapsed into one group, and the ANOVA was repeated for NCOM subjects and control subjects. As before, no differences were found (see Table 8). The prime (SRC, PPC, or unprimed) did not affect subjects' responses for ADDHRS.

TABLE 7

ANOVA for ADDHRS (n = 32)

Source	DF	SS	F value	PR > F
Prime	1	5.2813	1.65	0.2086
Error	30	95.9375	-	-

$R^2 = 0.0522$

TABLE 8

ANOVA for ADDHRS (n = 48)

Source	DF	SS	F value	PR > F
Prime	1	3.7604	1.04	0.3130
Error	46	166.2188	-	-

$R^2 = 0.0221$

Though the prime generally had no affect, one anomaly was uncovered. Control subjects' responses for ADDHRS were significantly correlated with BUDHRS, whereas treatment subjects' responses for ADDHRS were much less correlated with BUDHRS. The Pearson correlation coefficients between ADDHRS and BUDHRS for control, NCOM treatment, and COM treatment subjects, were .7963 ($p < .0002$), .3762 ($p < .0365$), and -.2876 ($p < .1167$) respectively. No obvious explanation for this finding is evident.

Findings for H1

Hypothesis one states that auditors who are committed to their hypotheses are more likely to interpret evidence consistently with these hypotheses than auditors who are not committed. Operationally, H1 suggests that subjects who are committed will allocate more additional hours to the cycle selected than subjects who are not committed. A two-way ANOVA was conducted to assess this hypothesis. Level of commitment was the primary variable of interest. A significant effect

was expected for this factor. The cycle selected was also included in the analysis, but no significant effect was expected for this factor. The variable was added to the model, as a blocking factor, after the priming manipulation was determined to be unsuccessful. The number of additional hours allocated to the cycle selected was used as the dependent variable (ADDHRS). Although subjects' responses were provided in terms of percentages, ADDHRS was calculated simply by multiplying the number of additional hours available by the percentage allocation chosen. As an example, if a subject selected the SRC and chose 60% SRC/40% PPC as an allocation scheme for additional hours, the dependent variable would be 12 hours (20 hours x 60%). Since subjects' responses were constrained to one of seven allocation schemes, the dependent variable ranged from 7 hours to 13 hours. Hypothesis one suggests that ADDHRS will be greater for subjects who are committed than those who are not committed. Mean scores for ADDHRS are presented in Table 9. The frequency of responses is shown in Figure 4. On average, subjects who were committed to their hypotheses allocated more additional hours to the cycle selected than subjects who were not committed. Subjects also allocated more additional hours to the SRC than the PPC. Further analysis was conducted to determine if these differences were significant.

TABLE 9
Mean Scores for ADDHRS

	COM	NCOM	CONTROL	Totals
Select SRC	11.3636 n=11	10.5833 n=12	12.3333 n=3	11.1154 n=26
Select PPC	10.8500 n=20	9.1060 n=20	9.7692 n=13	9.9245 n=53
Totals	11.0323 n=31	9.6563 n=32	10.2500 n=16	

Before ANOVA was performed (and H1 assessed), the appropriateness of the method given the data was considered. Subjects' responses for ADDHRS do not appear to be normally distributed (see Figure 4), and normality is an underlying assumption of ANOVA. However, the F test for equality of factor level means is largely unaffected (either in terms of the level of significance or power of the test) by lack of normality. The robustness of the F test in the face of departures from normality is well documented (see Neter and Wasserman, 1974, pp. 513-514). In addition, a test was performed to check for homogeneity of variances between treatment groups. Scheffe's test was used since it is not sensitive to departures from normality (Winer, 1971, p. 219). The calculated test statistic was 2.1023 and the critical value for $F_{.90(3,12)}$ was 2.6100. Accordingly, the null hypothesis (that the variance between treatment groups are the same) was not rejected.

FREQUENCY

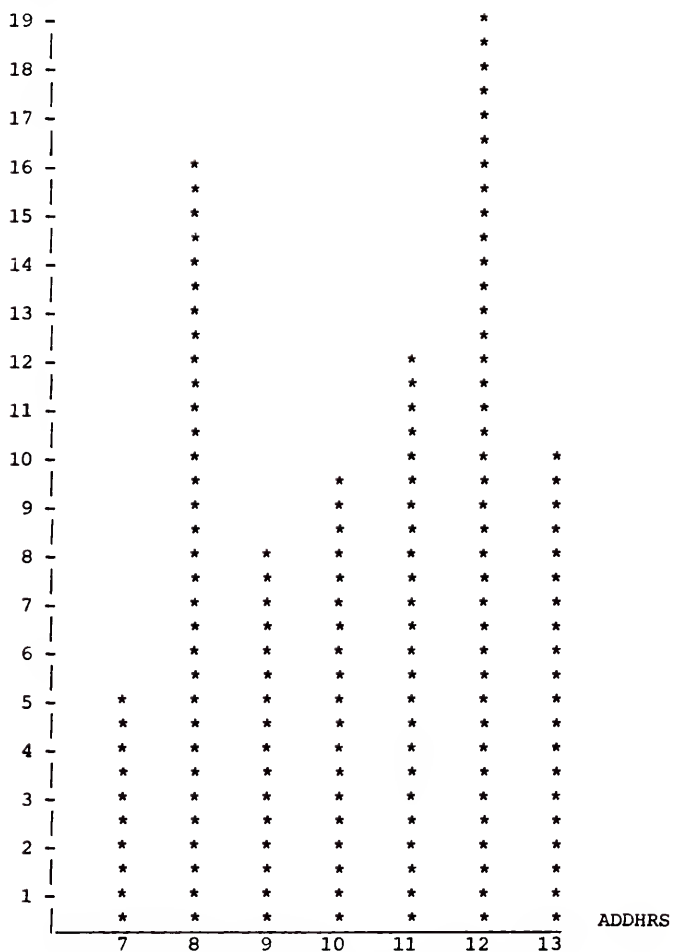


Figure 4: Frequency of Responses for ADDHRS

The following model was run:

$$Y_{ijk} = \mu + \alpha_i + \beta_j + (\alpha\beta)_{ij} + \epsilon_{ijk}$$

where

Y_{ijk} is the k th observed response (ADDHRS) for the i th level of the cycle selected and the j th level of commitment,

μ is the population mean,

α_i is the main effect of the i th level of the cycle selected,

β_j is the main effect of the j th level of commitment,

$(\alpha\beta)_{ij}$ is the interaction effect, and

ϵ_{ijk} is the random error associated with the k th response.

The model was run for (1) treatment subjects and (2) all subjects (control subjects who were included in this analysis were all partitioned into the noncommitment treatment group). The results were similar in both cases. Commitment and the cycle selected each had a significant effect (see Tables 10 and 11). The two analyses were repeated without the four subjects who had less than a year's audit experience. The results were unaffected by the exclusion of these subjects.

TABLE 10

ANOVA for ADDHRS ($n = 63$)

Source	DF	SS	F value	PR > F
Commitment	1	23.3459	7.92	0.0066
Select	1	14.5415	4.94	0.0302
Commitment x Select	1	3.4288	1.16	0.2851
Error	59	173.8121	-	-
$R^2 = 0.2171$				

TABLE 11

ANOVA for ADDHRS (n = 79)

Source	DF	SS	F value	PR > F
Commitment	1	15.4432	4.96	0.0290
Select	1	18.2458	5.86	0.0179
Commitment x Select	1	4.6884	1.50	0.2238
Error	75	233.6652	-	-

$$R^2 = 0.1861$$

Although H1 predicts a significant effect for commitment, a significant effect for the cycle selected was not expected. Accordingly, univariate analyses were undertaken to investigate the specific effect of commitment for each cycle. The main finding was that commitment had a significant effect only when the PPC was selected (see Tables 12 and 13). These results did not change when the four subjects with less than a year's audit experience were excluded from the sample. The findings for each univariate analysis are discussed further below.

TABLE 12

ANOVA for ADDHRS by CYCLE (n = 63)

Cycle Selected = SRC (n = 23)

Source	DF	SS	F value	PR > F
Commitment	1	3.4944	1.48	0.2367
Error	21	49.4621	-	-

$$R^2 = 0.0660$$

Cycle Selected = PPC (n = 40)

Source	DF	SS	F value	PR > F
Commitment	1	30.6250	9.36	0.0041
Error	38	124.3500	-	-

$$R^2 = 0.1976$$

TABLE 13

ANOVA for ADDHRS by CYCLE (n = 79)

Cycle Selected = SRC (n = 26)

Source	DF	SS	F value	PR > F
Commitment	1	1.1751	0.47	0.4977
Error	24	59.4788	-	-
$R^2 = 0.0194$				

Cycle Selected = PPC (n = 53)

Source	DF	SS	F value	PR > F
Commitment	1	27.5117	8.06	0.0065
Error	51	174.1864	-	-
$R^2 = 0.1364$				

When the PPC was selected, commitment had a significant effect; however, a comparison of cell means was necessary to determine if this result is consistent with H_1 . The COM subjects should have assigned more additional hours to the cycle selected than the NCOM subjects. The cell mean for COM subjects was compared with the means for two groups of NCOM subjects: treatment subjects (NCOM) and treatment plus control subjects (NCOM+). The results indicated that the mean for COM (10.8500) was significantly greater ($p < .05$) than the means for NCOM (9.100) and NCOM+ (9.3636) subjects. This finding is consistent with H_1 .

Secondary analysis was performed to investigate the extent to which subjects interpreted information cues as being either consistent or inconsistent with their hypotheses. Comparisons were made between the percentage of additional hours (%ADDHRS) allocated to the cycle selected (made after the information cues were presented) and the percentage of budgeted hours (%BUDHRS) allocated to that cycle (made initially after a cycle was selected as the most likely source for the unexpected fluctuation). The difference between these responses (%ADDHRS-%BUDHRS)

may provide insight into the consistency or inconsistency of information interpretation. A positive difference ($\%ADDHRS - \%BUDHRS \geq 0$) suggests that interpretation is strongly consistent, whereas a negative difference ($\%ADDHRS - \%BUDHRS < 0$) suggests that interpretation is strongly inconsistent. No difference between these responses ($\%ADDHRS - \%BUDHRS = 0$) is ambiguous as to interpretation of information cues. In this case, interpretation may be slightly consistent, slightly inconsistent, or indifferent. T tests were conducted to determine if $\%ADDHRS - \%BUDHRS$ was significantly different from zero for subjects in the COM, NCOM, and NCOM+ groups, respectively. The results are shown in Table 14. The COM subjects showed a marginally-significant, positive difference. A closer inspection of the data revealed that $\%ADDHRS - \%BUDHRS$ was negative for five of the twenty subjects in this group, and in each case, this difference was at least 10. These responses were likely to have contributed to the lack of an interaction effect in the overall analysis. The difference was positive for all other subjects except one, where it was zero. A sign test (Conover, 1980) was performed to determine if this difference was more likely to be positive than negative. This proposition was accepted at a significance level of .05. The COM subjects were more likely to interpret evidence consistently with their hypotheses than inconsistently.

TABLE 14
T Tests for $\%ADDHRS - \%BUDHRS$ (PPC)

Group	n	Means	Std Dev	T	PR > T
COM	20	6.2500	14.5886	1.92	0.0705
NCOM	20	-4.7500	10.5724	-2.01	0.0589
NCOM+	33	-2.4242	9.3643	-1.49	0.1468

The NCOM subjects showed a marginally-significant, negative difference for %ADDHRS-%BUDHRS. An examination of the data indicated that this difference was negative for twelve subjects, positive for five subjects, and zero for three subjects. A sign test was performed to determine if %ADDHRS-%BUDHRS was more likely to be negative than positive. The proposition is accepted at a marginal level of significance ($p < .0835$). This finding is consistent with the result of the t test. Finally, %ADDHRS-%BUDHRS was not significantly different from zero for NCOM+ subjects. The inclusion of control subjects drives this result. The difference between %ADDHRS and %BUDHRS was zero for seven control subjects, positive for three control subjects, and negative for three control subjects.

For subjects who selected the SRC, commitment did not have a significant effect. The mean responses for ADDHRS were 11.3636, 10.5833, and 10.9333 for COM, NCOM, and NCOM+ subjects, respectively. The differences were not statistically significant. This finding is not consistent with H1. Secondary analysis was conducted to determine if %ADDHRS-%BUDHRS was significantly different from zero for COM, NCOM, and NCOM+ subjects. The results of t tests are shown in Table 15. The difference between %ADDHRS and %BUDHRS was exactly zero for COM subjects. The difference was marginally significant and negative for NCOM subjects and insignificant for NCOM+ subjects. Sign tests were also performed. The difference between %ADDHRS and %BUDHRS was no more likely ($p < .10$) to be positive than negative for COM subjects. The difference was positive for four subjects, negative for five subjects, and zero for two subjects. In contrast, the difference was more likely

to be negative than positive for NCOM subjects at a significance level of .05. The difference was positive for one subject, negative for seven subjects, and zero for four subjects. Finally, the difference was no more likely ($p < .10$) to be positive than negative for NCOM+ subjects. The inclusion of control subjects drives this result also. The difference between %ADDHRS and %BUDHRS was positive for two control subjects and zero for one control subject.

TABLE 15

T Tests for %ADDHRS-%BUDHRS (SRC)

Group	n	Means	Std Dev	T	PR > 1T1
COM	11	0.0000	12.4499	0.00	1.0000
NCOM	12	-5.0000	9.5346	-1.82	0.0966
NCOM+	15	-2.6677	10.1536	-1.02	0.3263

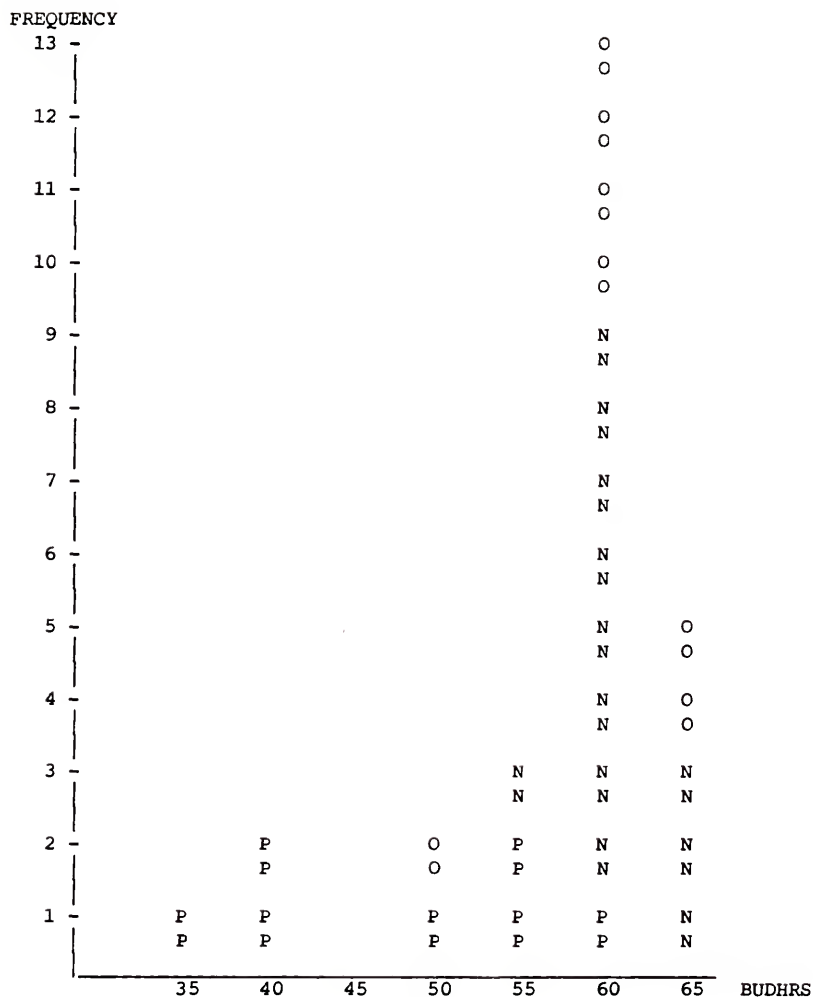
Subjects' responses for ADDHRS were likely to be affected by their responses for BUDHRS. Nonexperimental factors may have caused subjects who selected the SRC to respond differently for BUDHRS than subjects who selected the PPC. Mean scores for BUDHRS are presented in Table 16. The distribution of responses for subjects who selected the SRC and the PPC are shown in Figures 5 and 6, respectively. Responses that were subsequently revised upward (%ADDHRS-%BUDHRS \geq 0), downward (%ADDHRS-%BUDHRS \leq 0), and not at all (%ADDHRS-%BUDHRS=0) are also identified in Figures 5 and 6.

TABLE 16
Mean Scores for BUDHRS

	COM	NCOM	CONTROL	Totals
Select SRC	56.8182 n=11	57.9167 n=12	55.0000 n=3	57.1154 n=26
Select PPC	48.0000 n=20	50.2500 n=20	47.6923 n=13	48.7736 n=53
Totals	51.1290 n=31	53.1250 n=32	49.0625 n=16	

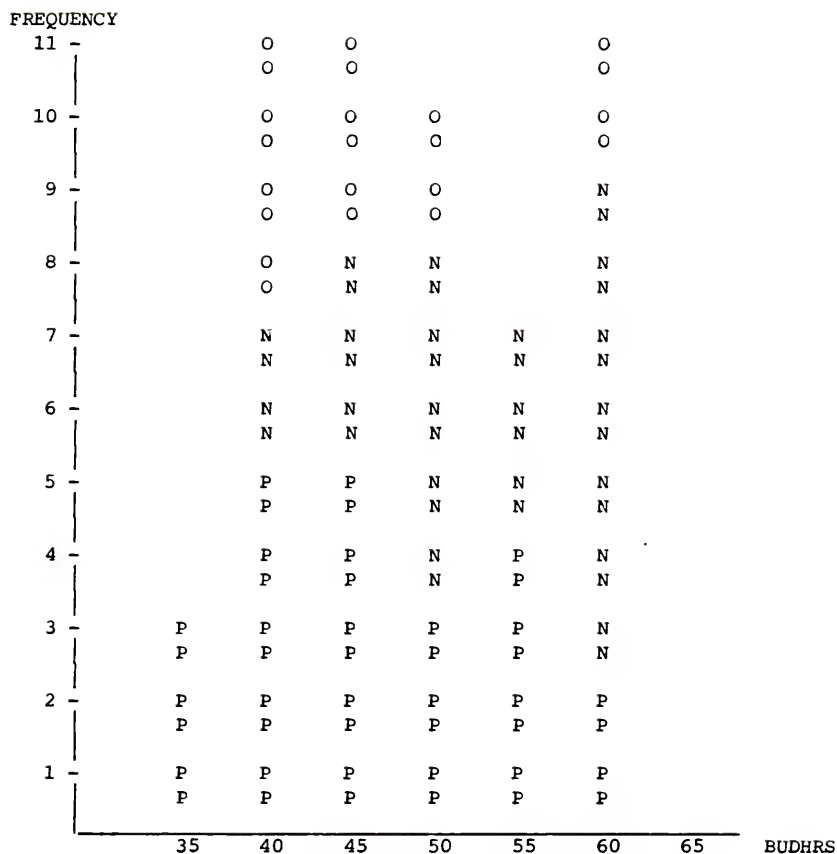
For the most part, subjects allocated at least as many budgeted hours to the SRC as the PPC. Moreover, eighteen of twenty-six subjects who selected the SRC (including seven of eleven COM subjects) gave an original allocation of at least 60% SRC/40% PPC (the second most extreme allocation). Only one of these eighteen subjects subsequently revised the chosen allocation scheme upward. Subjects who selected the SRC apparently allocated such a large percentage of budgeted hours to that cycle that no "room" was left for upward adjustment. On the other hand, only eleven of fifty-three subjects who selected the PPC gave an original allocation as extreme as 60% PPC/40% SRC. An inspection of Figures 5 and 6 indicates that responses were much more evenly distributed for subjects who selected the PPC than those who selected the SRC. Consequently, subjects who selected the PPC had "room" for either upward or downward adjustment.

The Pearson correlation coefficients between %BUDHRS and %ADDHRS-%BUDHRS for subjects who selected the SRC and the PPC were $-.7081$ ($p > .0001$) and $-.5958$ ($p > .0001$), respectively. Subjects who chose a relatively high %BUDHRS for the cycle selected were less likely to



P represents responses subsequently revised upward.
 N represents responses subsequently revised downward.
 O represents responses that were not subsequently revised.

Figure 5: Frequency of Responses for BUDHRS: Cycle Selected=SRC



P represents responses subsequently revised upward.

N represents responses subsequently revised downward.

O represents responses that were not subsequently revised.

Figure 6: Frequency of Responses for BUDHRS: Cycle Selected=PPC

increase that percentage than were subjects whose %BUDHRS were lower. Consequently, the lack of a commitment effect for subjects who selected the SRC may be due to a ceiling effect.

As a precaution, the reasons that subjects provided for selecting a particular cycle were examined to assess the validity of the commitment manipulation. The COM subjects who selected the SRC may not, in fact, have been committed to their hypotheses. These subjects may have been reluctant to select a particular cycle since very little background information had been given. As such, they may have hedged themselves in their written responses. They may have expressed doubt in their initial selections and/or they may have given reasons supporting both cycles. An independent rater read the responses for the thirty-one COM subjects and coded them as (1) committed to the SRC, (2) committed to the PPC, or (3) not committed to a particular cycle. Twenty-six subjects were coded as committed to the cycle that they initially selected. The other five subjects were coded as not committed to a particular cycle. Two of these subjects selected the SRC and the remaining three selected the PPC. The univariate analyses discussed above were repeated deleting these five subjects from the sample. The results, however, were unaffected. Commitment had a significant effect for subjects who selected the PPC and no effect for subjects who selected the SRC.

While the results were consistent with H1 when the PPC was selected, an alternative explanation to H1 should be acknowledged. Subjects' allocations of additional hours may have been compensating for original allocations that were too extreme in favor of the cycle that

was not selected. This explanation can be assessed by examining subjects' allocations of total hours (TOTHRs), which were collected at the end of the task. These allocations should indicate the cycle that subjects favor (the one that they believe should be assigned more hours) after viewing all of the evidence. A compensating response was defined as a response where ADDHRS favored (more hours were assigned to) a different cycle than both TOTHRs and BUDHRS. Only four out of seventy-nine subjects did not favor the same cycle for ADDHRS and TOTHRs, suggesting that subjects were not offsetting extreme responses for BUDHRS. The four inconsistent responses were classified into two groups. Two responses appeared to be ambiguous: subjects favored the same cycle for BUDHRS and ADDHRS and the other cycle for TOTHRs. The other two responses appeared to be compensating: subjects favored the same cycle for BUDHRS and TOTHRs and the other cycle for ADDHRS. The analysis discussed above was repeated deleting these observations from the sample. Three versions of the analysis were conducted: without ambiguous responses, without compensating responses, and without all inconsistent responses. In all three cases, the basic results were the same. Consequently, this alternative explanation is rejected.

Findings for H2

Hypothesis two states that when search is prescribed, auditors who are committed to their hypotheses are likely to show a preference for examining potentially confirming evidence before other evidence, whereas auditors who are not committed are not likely to show a preference. For analysis, the hypothesis is broken down into two parts, and each part is

examined separately. The first part of the hypothesis (H2A) suggests that subjects who are committed will examine potentially confirming cues before other cues (potentially disconfirming and neutral). The second part of the hypothesis (H2B) suggests that subjects who are not committed will not show a preference for the sequence in which information cues are examined. While the information cues are referred to as confirming and disconfirming in the discussion that follows, it should be remembered that during search the cues are only potentially confirming and disconfirming. That is, subjects do not examine a complete cue until it is selected and interpreted.

A randomization procedure (Conover, 1980) was used to assess both H2A and H2B. Subjects were presented with ten information cues: four for the SRC, four for the PPC, and two for the PYC (payroll and personnel cycle). Four cues could be classified as confirming and four could be classified as disconfirming. For example, for subjects who selected the SRC, the cues for the SRC were considered confirming and those for the PPC were considered disconfirming. The PYC cues were always considered neutral. Cues were ranked from 1 to 10 in the order to which they were attended. The rank scores for confirming and disconfirming cues then were summed. For example, if a subject selected the SRC and examined the cues for that cycle in the 3rd, 4th, 7th, and 8th positions, a rank sum of 22 ($3+4+7+8$) was assigned for confirming cues. A low rank sum indicates that the particular cues were given early attention. A total of $\binom{10}{4}$ or 210 possible rank-sum combinations were available, where rank sums ranged from 10 ($1+2+3+4$) to 34 ($7+8+9+10$). The randomization procedure assumes that each possible

rank-sum combination has an equal chance of being chosen. A distribution of the 210 possible combinations was enumerated. The frequency distribution is shown in Figure 7. The tails of the distribution were examined to assess H2. Rank sums located in the lower tail indicate that particular (confirming or disconfirming) cues were attended before other cues, whereas rank sums located in the upper tail indicate that particular (confirming or disconfirming) cues were attended after other cues. The cut off for a significance level of .05 in the lower tail is a rank sum of 14. The cut off for a significance level of .05 in the upper tail is a rank sum of 30. Each cut-off value represents one of the twelve ($210 \times .05$) most extreme possibilities located in the tails of the distribution (see Figure 7). These cut-off values were compared with rank-sum means calculated for (1) COM subjects to assess H2A and (2) NCOM and NCOM+ subjects to assess H2B.

The first part of H2 is not rejected if the rank-sum mean for confirming cues (of COM subjects) is found to be 14 or less. A mean of 14 or less would indicate that these cues were examined before other cues. Although H2A is only concerned with the sequence in which confirming cues are attended, the sequence in which disconfirming cues are attended is also investigated for completeness. Means of 20.1613 and 20.7419 were calculated for confirming cues (of COM subjects) and disconfirming cues (of COM subjects), respectively. The finding for confirming cues is not consistent with H2A. While disconfirming cues are not considered in H2A, the finding indicates that subjects did not show a preference for the order that these cues were attended. The mean is above the lower cut off and below the upper cut off. Subsequently,

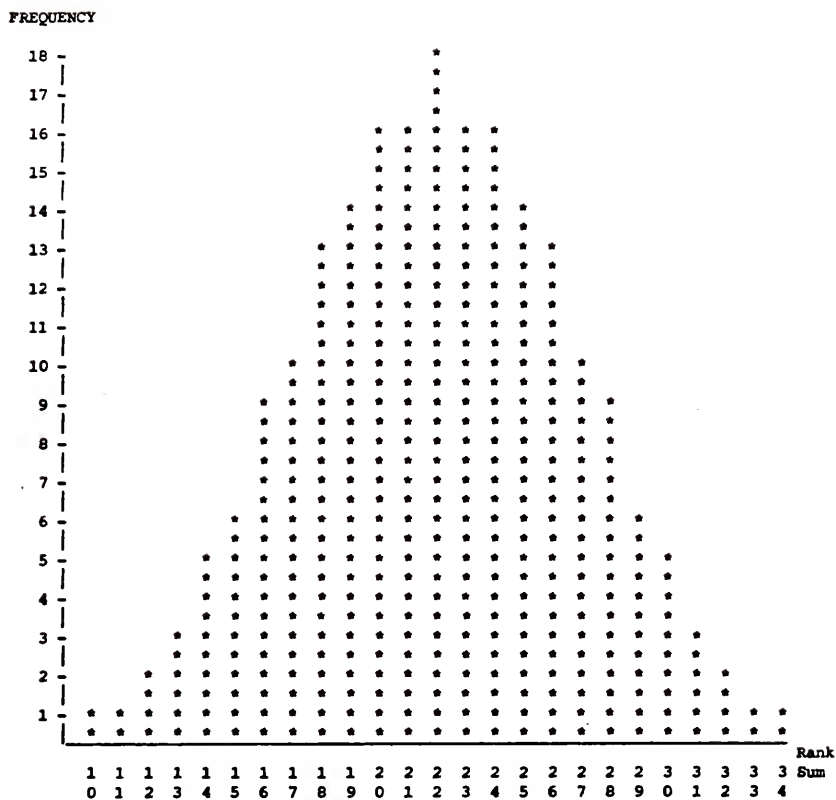


Figure 7: Frequency Distribution for Rank-Sum Combinations

each cycle was analyzed separately. Again, COM subjects did not show a preference for attending to confirming cues or disconfirming cues (see Table 17). Since confirming cues were not examined before other cues, H2A is rejected.

TABLE 17

Rank-Sum Means for COM Subjects

	SRC	PPC
Confirming	19.5455	20.3000
Disconfirming	21.6366	20.2500

The second part of H2 is not rejected if the rank-sum means for confirming and disconfirming cues (of NCOM and NCOM+ subjects) are found to be between 14 and 30. Means between 14 and 30 would indicate that subjects do not have a preference for the sequence in which cues are attended. Means of 19.6875 and 19.4792 were calculated for confirming cues of NCOM and NCOM+ subjects, respectively. Means of 21.7500 and 21.5417 were calculated for disconfirming cues of NCOM and NCOM+ subjects, respectively. These findings are consistent with H2B. All means are between 14 and 30. In addition, each cycle was analyzed separately; however, the results did not change (see Tables 18 and 19). Since subjects who were not committed did not show a preference for the sequence in which cues were examined, H2B is not rejected.

TABLE 18

Rank-Sum Means for NCOM Subjects

	SRC	PPC
Confirming	19.0006	18.5000
Disconfirming	20.6667	21.7000

TABLE 19
Rank-Sum Means for NCOM+ Subjects

	SRC	PPC
Confirming	18.8000	19.6970
Disconfirming	21.2000	21.3030

Subsequent analysis was undertaken to explain the findings discussed above. In particular, an attempt was made to explain why commitment did not have an effect. Cues may have been examined in order of importance. The importance scores assigned to cues were correlated with the order that they were attended. The Spearman correlation coefficient for all subjects was $-.0581$ ($p < .1450$). Apparently, importance did not affect the order that cues were attended. A closer inspection of the data revealed a systematic pattern of search for some subjects. Forty-four subjects attended to cues by cycle. All of the cues in each cycle were attended in sequence. Moreover, six other subjects attended to cues by cycle with the exception of one cue. This cue was not attended in sequence. The remaining subjects did not show any discernible patterns of search. Subjects who did show a systematic pattern of search were classified according to (1) treatment group (COM, NCOM, and control) and (2) the cue class (confirming, disconfirming, and neutral) that was examined first (see Table 20). An examination of Table 20 does not reveal an obvious explanation for why some subjects followed a systematic pattern of search and others did not. Nevertheless, the finding that a majority of subjects followed a systematic pattern is notable.

TABLE 20

Subjects Who Followed a Systematic Pattern of Search

	COM	NCOM	CONTROL
Confirming	11	6	2
Disconfirming	8	5	2
Neutral	3	4	3

The Underlying Cognitive Mechanisms

Further analysis was performed to explore the cognitive mechanisms underlying subjects' judgments. Responses to recall and importance questions were investigated. For recall, subjects recorded the number of exceptions that were uncovered in each compliance test. These responses were subsequently coded as correct or incorrect. For importance, subjects responded on a seven-point scale, anchored by extremely important and extremely unimportant, indicating the weight that they would assign to each compliance-test result. Responses to recall and importance questions were classified as confirming or disconfirming, depending on the cycle selected. As an example, if a subject selected the SRC, responses to questions about this cycle were classified as confirming and responses to questions about the PPC were classified as disconfirming. Subjects' responses were summed for each classification and grouped by level of commitment. This procedure resulted in four groups for each set of responses. The analysis involved a comparison of cell means. The specific means that were compared will be discussed below.

Subjects' responses for confidence in recall were also investigated. As above, the analysis involved a comparison of cell

means. It will be remembered that the model developed in Chapter II does not provide a basis for any predictions as to effects on confidence, and hence this analysis is purely exploratory.

Findings for H3: Recall

Hypothesis three states that auditors who are committed to their hypotheses are more likely to discount disconfirming evidence than auditors who are not committed. This evidence is likely to be processed at a deeper level than confirming evidence when auditors are committed. Operationally, H3 suggests that subjects who are committed will be more likely to recall disconfirming cues than confirming cues. The hypothesis also suggests that these subjects will be more likely to recall disconfirming cues than subjects who are not committed. The number of confirming (CONF) and disconfirming (DONF) cues recalled correctly was summed and grouped by level of commitment. Summary statistics are shown in Table 21. As with earlier analysis, two noncommitment groups are presented: NCOM and NCOM+. NCOM included treatment subjects and NCOM+ included treatment plus control subjects.

TABLE 21

Summary Statistics for Recall

	Mean	Std Dev	Std Error
COM/DONF	1.5484	1.0276	0.1846
COM/CONF	1.4839	1.0605	0.1905
NCOM/DONF	1.5323	0.8793	0.1554
NCOM/CONF	1.5625	0.9136	0.1615
NCOM+/DONF	1.5417	0.9216	0.1330
NCOM+/CONF	1.4375	0.8482	0.1224

Hypothesis three suggests the following relationships for recall:

$$\text{COM/DONF} > \text{COM/CONF}$$

$$\text{COM/DONF} > \text{NCOM/DONF},$$

$$\text{and } \text{COM/DONF} > \text{NCOM+ /DONF}.$$

T tests were used to test for differences between these groups. No statistically significant differences ($p < .10$) were found. Subjects recalled the same number of confirming and disconfirming cues, regardless of level of commitment. This finding is not consistent with H3. The analysis was repeated for each cycle separately, but the results did not change. Once again, commitment did not have an effect. Summary statistics for recall by the cycle selected are shown in Tables 22 and 23. A subsequent analysis was performed to assess effects of the order in which recall questions were presented. One half of the subjects had been given a predetermined order, and the other half had been given this order reversed. A t test revealed no significant differences ($p < .10$) between the two groups. It appears that the order in which recall questions were presented did not have an effect on recall.

TABLE 22

Summary Statistics for Recall: Cycle Selected=SRC

	Mean	Std Dev	Std Error
COM/DONF	0.9090	1.0445	0.3149
COM/CONF	0.9090	0.5312	0.2506
NCOM/DONF	1.3333	0.8876	0.2562
NCOM/CONF	1.5833	0.7930	0.2289
NCOM+ /DONF	1.4000	0.8281	0.2138
NCOM+ /CONF	1.4000	0.8281	0.2138

TABLE 23

Summary Statistics for Recall: Cycle Selected=PPC

	Mean	Std Dev	Std Error
COM/DONF	1.9000	0.8522	0.1906
COM/CONF	1.8000	1.0563	0.2362
NCOM/DONF	1.6500	0.8751	0.1957
NCOM/CONF	1.5500	0.9987	0.2233
NCOM+/DONF	1.6060	0.9663	0.1682
NCOM+/CONF	1.4545	0.8693	0.1513

Although the findings were not expected, ex post investigation suggests a plausible explanation. Recall was likely to be affected by the symmetry associated with the information cues. Cues were recalled in symmetrical pairs. Similar tests were conducted for each cycle, and the exception rates were the same for each type of test. If subjects noticed this symmetry, they may have recalled confirming and disconfirming cues in corresponding (symmetrical) pairs. Subjects only had to remember one exception rate in order to correctly recall two cues. In addition, the general nature of these cues may have heightened the associated symmetry. Very little firm-specific information was provided.

The results indicate that subjects recalled the same number of confirming and disconfirming cues -- regardless of the cycle selected or level of commitment. On average, subjects recalled 3 of 8 cues (excluding the neutral cues). A total of 237 (79 subjects x 3 cues recalled per subject) cues were recalled correctly. Of this total, 150 cues were recalled in corresponding pairs. A chi-square goodness-of-fit test was conducted to determine if cues were more likely to be recalled in pairs. A test statistic of 16.75 was calculated. The cut off for a significance level of .005 was $\chi^2 = 7.88$. Subjects tended to recall cues

in corresponding pairs (see Table 24), and hence, symmetry appears to have had an effect on recall.

TABLE 24

Chi-Square Goodness-of-Fit Test for Corresponding Pairs

	Recall By Pair	Recall Not By Pair	Significance Level
Observed Cell Frequencies	150	87	0.005
Expected Cell Frequencies	118.50	118.50	

Subjects apparently recognized cue symmetry to some degree; however, they may not have noticed that all cues (except neutral cues) were symmetric. Subjects had been asked to indicate if the number of exceptions uncovered in the SRC and the PPC, respectively, was the same or different. If symmetry was obvious, subjects should have responded that the same number of exceptions was found. A chi-square goodness-of-fit test was performed to assess this proposition. The results indicate that symmetry was not obvious. Subjects did not recognize the symmetry associated with all cues (see Table 25). Nevertheless, the fact that subjects recalled cues in symmetric pairs reduces the inferences that can be drawn from this measure. Cues recalled correctly were not necessarily processed at a deeper level than cues recalled incorrectly.

TABLE 25

Chi-Square Goodness-of-Fit Test for Recognition of Symmetry

	Same Number of Exceptions	Different Number of Exceptions	Significance Level
Observed Cell Frequencies	22	57	.005
Expected Cell Frequencies	39.50	39.50	

Findings for H3: Importance

Importance measures were also used to assess H3. Auditors who are committed to their hypotheses are more likely to discount (assign less importance to) disconfirming evidence than auditors who are not committed. Operationally, H3 suggests that committed subjects will be more likely to assign less importance to disconfirming cues than confirming cues. The hypothesis also suggests that these subjects will be more likely to assign less importance to disconfirming cues than subjects who are not committed. The importance scores assigned to confirming (CONF) and disconfirming (DONF) cues were summed and grouped by level of commitment. Summary statistics are presented in Table 26. As above, two noncommitment groups are included: NCOM and NCOM+.

TABLE 26

Summary Statistics for Importance

	Mean	Std Dev	Std Error
COM/DONF	18.7742	3.8791	0.6967
COM/CONF	19.7742	3.9976	0.7180
NCOM/DONF	18.6250	3.9574	0.6996
NCOM/CONF	17.8750	4.2331	0.7483
NCOM+/DONF	18.1250	3.7566	0.5422
NCOM+/CONF	17.6170	4.3316	0.6318

Hypothesis three suggests the following relationships for importance:

$$\text{COM/DONF} < \text{COM/CONF}$$

$$\text{COM/DONF} < \text{NCOM/DONF},$$

$$\text{and } \text{COM/DONF} < \text{NCOM+ /DONF}.$$

T tests were used to test for differences between these groups. No predicted differences ($p < .10$) were found. Subjects apparently assigned equal importance to confirming and disconfirming cues, regardless of level of commitment. This finding is not consistent with H3. Differences between groups were also investigated for each cycle separately. Summary statistics are presented in Tables 27 and 28. For the most part, the results were not consistent with H3; however, one predicted difference was noted. The COM subjects who selected the SRC assigned less importance ($p < .0115$) to disconfirming cues than confirming cues. No other predicted differences ($p < .10$) were found. The possibility that the order in which importance questions were presented had an effect also was considered. As with recall, one half of the subjects were given these questions in a predetermined order, and the other half were given this order reversed. A t test was performed to assess effects of order of presentation. No significant differences ($p < .10$) were found. The order in which importance questions were presented apparently did not have an effect.

TABLE 27

Summary Statistics for Importance: Cycle Selected=SRC

	Mean	Std Dev	Std Error
COM/DONF	17.2727	3.7441	1.1289
COM/CONF	20.9091	3.3303	1.0041
NCOM/DONF	16.1667	4.0862	1.1796
NCOM/CONF	18.6667	3.6265	1.0469
NCOM+/DONF	15.9333	3.8816	1.0022
NCOM+/CONF	18.4000	4.2561	1.0989

TABLE 28

Summary Statistics for Importance: Cycle Selected=PPC

	Mean	Std Dev	Std Error
COM/DONF	19.6000	3.7892	0.8473
COM/CONF	19.1500	4.2708	0.8550
NCOM/DONF	20.1000	3.1271	0.6992
NCOM/CONF	17.4000	4.5814	1.0244
NCOM+/DONF	19.1212	3.2954	0.5737
NCOM+/CONF	17.2500	4.3847	0.7751

Further analysis was conducted with respect to the importance that subjects assigned to various cues. Table 27 indicates that subjects who selected the SRC tended to rate confirming (SRC) cues as more important, whereas Table 28 shows that subjects who selected the PPC tended to rate disconfirming (SRC) cues as more important. Regardless of the cycle selected or level of commitment, subjects appear to have assigned more importance to the SRC cues than the PPC cues. T tests were performed to determine if the importance assigned to SRC cues minus the importance assigned to PPC cues was significantly different from zero for COM, NCOM, and NCOM+ subjects, respectively. Except for COM subjects who selected the PPC, the groups tended to assign more importance to the SRC cues (see Table 29). These results are consistent with the earlier

finding that subjects originally allocated more hours to the SRC than the PPC.

TABLE 29

T Tests for SRC-PPC by Cycle

Cycle Selected = SRC

	Mean	Std Dev	T	PR > 1T1
COM	3.6364	3.9057	3.09	0.0115
NCOM	2.5000	5.7446	1.51	0.1598
NCOM+	2.4667	5.2897	1.81	0.0925

Cycle Selected = PPC

	Mean	Std Dev	T	PR > 1T1
COM	0.4506	4.1861	0.48	0.6362
NCOM	2.7000	4.4022	2.74	0.0129
NCOM+	1.9688	4.4550	2.50	0.0179

Subjects may have generalized their responses for importance questions. They may not have considered the task in responding to these questions since very little firm-specific information was provided. In addition, the form that these questions were asked may have encouraged a generalized response. Subjects were asked to indicate how important each test result could have been in explaining the fluctuation in gross margin, but the exception rates given in the task were not provided with the questions. This characteristic confounds importance with recall. Subjects may only have been able to respond in very general terms.

If subjects did in fact respond in general terms, the number of inferences that can be made from subjects' importance scores will be reduced. Alternatively, the predictions made for importance may be incorrect. The COM subjects who selected the PPC appeared to exhibit confirmatory bias, even though their responses for importance questions

were not consistent with H3. That hypothesis suggested that subjects who are committed will discount disconfirming cues individually as these cues are being attended. Instead, subjects may have discounted disconfirming cues on the whole rather than individually. Accordingly confirmatory bias may have occurred in information aggregation as opposed to information processing (as predicted). The present study did not investigate the aggregation phase. Further research is needed to assess this phase of interpretation.

Confidence

Confidence was also investigated in the present study. However, this investigation was purely exploratory since the model developed in Chapter II does not provide the basis for any predictions. Responses for confidence in recall were summed and grouped by correctness of recall: correct or incorrect. Mean scores of 4.4301 and 3.6828 were calculated for cues recalled correctly and incorrectly, respectively. A t test was performed to compare these mean scores, and a marginally significant difference ($p < .0750$) was found. Subjects tended to show more confidence in cues recalled correctly than incorrectly.

Next, confidence scores were grouped by level of commitment. Mean scores of 4.0471, 3.8907, and 4.0235 were calculated for COM, NCOM and NCOM+ subjects, respectively. Again, t tests were conducted to compare mean scores. No differences were found at a significance level of .10. Cues recalled correctly and incorrectly were examined separately, and this analysis again revealed no significant commitment effect. Mean

scores are shown in Table 30. In sum, level of commitment did not affect subjects' responses for confidence.

TABLE 30

Mean Scores for Confidence by Commitment and Correctness of Recall

	Correct Recall	Incorrect Recall
COM	4.3936	3.5817
NCOM	4.4646	3.7821
NCOM+	4.5175	3.7292

Lastly, confidence scores were grouped by cue classification: confirming or disconfirming. Mean scores of 3.9917 and 3.8250 were calculated for confirming and disconfirming cues, respectively. A *t* test was performed, and no significant difference ($p < .10$) was found. As above, this analysis was repeated for cues recalled correctly and incorrectly, respectively. Mean scores are presented in Table 31. The results indicate that cue classification did not affect subjects' responses for confidence.

TABLE 31

Mean Scores for Confidence by Cue Classification and
Correctness of Recall

	Correct Recall	Incorrect Recall
Confirming Cues	4.5556	3.6818
Disconfirming Cues	4.1381	3.7261

CHAPTER V

RESEARCH IMPLICATIONS AND LIMITATIONS

The implications of the study are discussed in this chapter. In addition, some research limitations are noted. A statement of the limitations is necessary to place the experimental findings in proper perspective. The chapter is organized into three sections. The first section provides a brief review of the experimental task and summarizes the results obtained. The second section discusses the implications drawn from the results. The final section identifies the potential weaknesses associated with the methodology that may limit the generalizability of the findings and suggests directions for future research.

Summary of the Experimental Study

A laboratory experiment was conducted to assess (1) the occurrence of confirmatory bias and (2) the cognitive mechanisms underlying auditors' judgments. A 2x2 factorial design was used, where the priming of a hypothesis and level of commitment were manipulated. The priming manipulation was purely an experimental device and no experimental predictions were made. It was intended to induce subjects to select a particular hypothesis and was included to improve the generalizability of the study. While the manipulation was unsuccessful (it did not affect subjects' selection patterns) a reasonable number of subjects

still selected each hypothesis. For analysis, at least ten subjects in each group (COM and NCOM) selected the sales and receivables cycle (SRC) and at least another ten selected the purchases and payables cycle (PPC). In contrast to the priming manipulation, predictions were made for the commitment manipulation. Level of commitment was expected to influence subjects assignment of audit effort. This manipulation did have an affect, as will be discussed below.

Confirmatory Bias

Subjects were asked to allocate budgeted hours (BUDHRS) and additional hours (ADDHRS) between the SRC and the PPC. They were also asked to select one of these cycles (i.e., choose an initial hypothesis) as the most likely source for an unexpected fluctuation in gross margin. One half of the subjects (the commitment group) was asked to prepare a written memo justifying their selection of a particular cycle. The other half (the noncommitment group) was not asked to prepare this memo. Hypothesis one suggested that subjects who were committed to their hypotheses were more likely to interpret evidence consistently with these hypotheses than subjects who were not committed.

A two-way ANOVA was performed, and as expected, commitment had a significant effect. However, the cycle selected also had a significant (and unexpected) effect. Univariate analyses indicated that commitment only had a significant effect when subjects selected the PPC. Subjects who were committed to the PPC allocated more additional hours to that cycle than the SRC. They also showed a tendency to increase the percentage of hours (%ADDHRS>%BUDHRS) allocated to the PPC. These

findings are consistent with H1. Subjects who were committed to the PPC showed signs of confirmatory bias. The results did not follow for subjects who were committed to the SRC. Although these subjects allocated more additional hours to the SRC than the PPC, the difference was not significant. Moreover, they did not change the percentage of hours (%ADDHRS=%BUDHRS) allocated to the SRC. These findings are not consistent with H1. Subjects who were committed to the SRC did not show signs of confirmatory bias. Further analysis suggested that these findings may be the result of a ceiling effect. Regardless of the cycle selected, subjects showed a tendency to allocate at least as many budgeted hours to the SRC as the PPC. Consequently, subjects who selected the SRC may have had little room for upward adjustment.

The order that subjects attended to information cues was also investigated. Hypothesis two suggested that subjects who were committed to their hypotheses were more likely to examine potentially confirming cues before other cues than subjects who were not committed. Information cues were ranked from 1 to 10 in the order to which they were attended. The assigned ranks were summed for potentially confirming and disconfirming cues. The frequency distribution of the possible rank-sum combinations was then enumerated and examined to determine if subjects attended to one class of cues before attending to other classes of cues. The results did not show a preference for order. Although the findings are not consistent with the information-search literature, the procedure employed was a prescribed, rather than strict, search task. Specifically, subjects were required to examine all cues. A strict search task does not impose this requirement. An order

preference may be more likely to arise when subjects have a choice in determining the cues that will be attended.

Cognitive Mechanisms

Subjects were asked to complete a debriefing questionnaire at the end of the task. Specifically, they were asked to (1) recall the information cues that had been presented and (2) assess the importance of these cues. They were also asked to indicate their confidence in recall. Responses for recall and importance questions were expected to provide insight into the cognitive mechanisms underlying auditors' judgments and specific predictions were made. Responses for confidence, on the other hand, were collected for exploratory investigation and no predictions were made.

For recall, H3 suggested that subjects who were committed to their hypotheses were more likely to remember disconfirming cues than confirming cues. The hypothesis also suggested that these subjects were more likely to remember disconfirming cues than subjects who were not committed. The number of information cues recalled correctly was summed and grouped by cue class. Comparisons were made to test for significant differences, and none were found. Subjects recalled the same number of confirming and disconfirming cues, regardless of the cycle selected or level of commitment. This result is not consistent with H3. However, the finding may be explained by the symmetry associated with the cues. In particular, subjects tended to recall cues in corresponding (symmetrical) pairs. This tendency was likely to have dominated any possible treatment effects.

For importance, H3 suggested that subjects who were committed to their hypotheses were more likely to assign greater weight to confirming cues than disconfirming cues. The hypothesis also suggested that these subjects were more likely to assign less weight to disconfirming cues than subjects who were not committed. Importance scores were summed and grouped by cue class. Comparisons were made to test for significant differences. Although differences were found, for the most part they were not consistent with expectations. In general, subjects assigned more importance to the SRC cues than the PPC cues. Only commitment subjects who selected the PPC failed to follow this pattern. They assigned equal importance to the SRC and the PPC cues. However, these findings are consistent with the way that subjects allocated originally budgeted hours. At least as many hours allocated to the SRC as the PPC. Subjects may have generalized their responses for importance as a result of the form of these questions. Importance questions did not disclose the number of exceptions uncovered in compliance testing for each control. In addition, very little firm-specific information was provided. Alternatively, the interpretation of cues may have been more affected by information aggregation than the discrete processing of each cue.

Finally, confidence scores were summed and grouped by correctness of recall. No predictions were made for this measure. The primary finding was that subjects tended to express more confidence when cues were recalled correctly rather than incorrectly. This result applies regardless of the cycle selected or level of commitment. No other significant differences were found.

Implications

Confirmatory bias was found to occur for subjects who were committed to the PPC. In contrast, no signs of the bias were found for subjects who were committed to the SRC. Subjects who were not committed, regardless of the cycle selected, also did not show signs of the bias. Consequently, in some cases confirmatory bias may affect audit judgment.

The bias is expected to occur when motivational and/or cognitive factors are present. However, audit-specific requirements may mitigate the effects of these factors. This may have been the case for subjects who were committed to the SRC. If a large amount of audit effort has been predetermined to be necessary for an area of investigation, this may preclude increases in the relative effort (assuming additional effort is made available) allotted to this area.

Confirmatory bias is more likely to occur when situational requirements intensify the effects of motivational and/or cognitive factors. Motivational factors were likely to have been heightened for subjects who were committed to the PPC. These subjects were required to formally document and justify their actions. In addition, they were told that their reasoning would be reviewed by peers. As a result, they may have felt compelled to maintain their positions. A possible consequence of heightening a motivational factor (i.e., commitment) is that auditors may fail to report evidence that does not support their positions (see Gibbins, 1984). Such actions may reduce the

effectiveness of the audit process and, ultimately, lead to third-party litigation.

The findings also suggest that auditors may maintain an open mindedness in information search, given that minimal search is required. Regardless of the level of commitment, subjects did not show a preference for the order that potentially confirming and disconfirming cues were attended. This result is consistent with an attitude of professional skepticism. Nevertheless, confirmatory bias still occurred for subjects who were committed to the PPC. Consequently, open mindedness in information search (at least prescribed search) may not preclude closed mindedness in information interpretation. The occurrence of the bias in one processing task may be independent of its occurrence in another processing task.

The results for the underlying mechanisms are not so clear. For the most part, subjects' responses for recall and importance questions were not consistent with predicted responses. Subjects who were committed to the PPC did not appear to explain away disconfirming cues one at a time, as suggested by the model developed in Chapter II. However, recall and importance measures may have been inappropriate for exploring the underlying mechanisms given the characteristics of the task (i.e., cue symmetry and little firm-specific information). The recall measure may not have captured level of processing since cues were recalled in corresponding (symmetric) pairs. Moreover, subjects' responses to importance questions may have been generalized. Generalized responses may have even been encouraged by the fact that (1) little firm-specific information was presented and (2) exception rates

were not disclosed when importance was elicited. As such, the importance measure may not have captured the importance assigned to specific cues.

Alternatively, subjects who were committed to the PPC may have explained away disconfirming cues as a whole. They may have reduced the overall importance assigned to these cues in information aggregation. Further research is necessary to assess the role that aggregation plays in information interpretation.

Limitations

The limitations of the study are discussed in this last section. Limitations associated with the task are presented, and then, the generalizability of the results are assessed. Suggestions for future research are also provided.

The occurrence of confirmatory bias was assessed by comparing subjects' responses between treatment groups. Predictions were made as to the expected differences between these groups, and the occurrence of the bias was inferred from the actual differences. Other studies (e.g., Swieringa et al., 1976) have tested for the occurrence of a bias by comparing subjects' responses with a normatively-based response, e.g., a Bayesian response. This comparison may provide a stronger basis for determining the presence of a bias. However, many real-world tasks are not readily expressed in normative terms. That is, a normatively-based response is not available. A tradeoff may exist between obtaining a realistic response and allowing for a normative comparison. Although these factors do not necessarily work against one another, the tradeoff

is real for this study. Specifically, the diagnosticity associated with audit evidence is usually not denominated in normative terms. The present study was more concerned with obtaining a realistic response than allowing for a normative comparison.

The underlying cognitive mechanisms were also assessed by comparing subjects' responses between treatment groups. An obvious limitation is that these mechanisms cannot be observed. Instead, they must be inferred from subjects' responses. This raises two potential problems. First, the recall measure may not have captured level of processing due to cue symmetry. Second, the importance measure may not have captured the weight assigned to specific cues due to the possibility that responses were generalized. As a result, the conclusions drawn for the underlying mechanisms are rather limited. The specific problems uncovered are discussed in detail in Chapter IV.

The usual controlled-experiment caveats also apply to the present study. The findings cannot be readily generalized due to factors such as the limited, nonrandom sample and the artificiality of the task. Moreover, the generalizability of the results is confounded by the apparent ceiling effect. Although subjects who were committed to the PPC showed signs of confirmatory bias, some other phenomenon (omitted variables) may have driven the results. Alternatively, subjects who were committed to the SRC may not have shown signs of confirmatory bias as a result of the ceiling effect. Future research is needed to address this issue.

The present study may be modified and repeated to gather additional evidence as to the occurrence of confirmatory bias. The following

changes are recommended: (1) subjects should not be required to allocate originally budgeted hours between the two cycles, but rather informed that a sufficient amount of effort (budgeted hours) has been allocated to each cycle for routine investigation; and (2) they should be told, in emphatic terms, that additional hours were allotted solely to search for the source of the unexpected fluctuation in gross margin, which may involve nonroutine or unplanned investigation.

In the present study, subjects' responses for additional hours were likely to have been affected by (1) their responses for budgeted hours and (2) the information cues that were presented. Subjects' responses for budgeted hours may have confounded their interpretations of information cues. The problem may have been heightened since subjects initially allocated at least as many hours to the SRC as the PPC regardless of the cycle selected. The effect that budgeted hours had on additional hours is not clear. An ex post analysis of covariance was conducted to determine if subjects' responses for budgeted hours had a systematic effect on their responses for additional hours. The number of hours initially budgeted to the cycle selected was added as a covariate to the model discussed in Chapter IV. The findings, though, were unaffected. The covariate did not have a significant effect. However, the response scale used for budgeted hours and additional hours may have worked against the covariate having an effect. Subjects' responses for budgeted hours were likely to have introduced noise into their responses for additional hours. With the present methodology, a test for the occurrence of confirmatory bias does not rely on responses

for budgeted hours, as long as subjects are randomly assigned to treatment groups. As a result, the initial allocation may be dropped.

The second change was suggested to draw subjects' attentions to the reason that additional hours were allotted. Subjects need to realize that those hours are solely for the investigation of the unexpected fluctuation, which entails unplanned investigation. It also should be made clear that originally budgeted hours are required for routine investigation (this investigation is necessary), and these hours may not be reallocated between the SRC and the PPC. In this sense, subjects' responses for additional hours should only reflect their interpretations of the evidence (information cues).

The present study may also be modified to assess whether confirmatory bias occurs in the processing phase or the aggregation phase of information interpretation. In the present study, subjects were asked to assign importance to specific information cues. The cues, however, were not completely disclosed within these questions. In other words, subjects were asked to assign importance to specific cues, albeit they could only examine (at the time of the questions) a portion of each cue. A complete disclosure may have made cue symmetry readily apparent, which would likely have caused problems. As an alternative, information cues may be completely disclosed and importance questions may be presented on more than one page, i.e., three pages. In this case, subjects should not be likely to notice cue symmetry. Subjects then may be asked to rank information cues (completely disclosed) in order of importance. This procedure forces subjects to choose between cues. It also may provide insight into the aggregation of information. Finally,

at some point subjects may be asked to indicate if the specific information cues presented for one cycle are more important than those presented for the other cycle, less important than those presented for the other cycle, or of equal importance to those presented for the other cycle. Subjects' responses may reveal their overall impressions of the information cues; however, this question must be placed carefully within the instrument so as not to contaminate other responses. Responses to the questions discussed above should provide a basis for making inferences about information processing and information aggregation.

APPENIDX A

MATERIALS FOR SUBJECTS WHO WERE PRIMED FOR THE SRC

Introduction

- Thank you for taking the time to participate in this project. The purpose is to gather information as to how various judgments are made that involve internal control. Specifically, your responses will be used to: (1) further research knowledge; and (2) develop case materials for instructional purposes. The research findings are expected to help in the development of decision aids, which ultimately may be incorporated into the audit program.

- This project consists of three parts. In Part One, you will be asked to evaluate various forms for presenting internal-control information. In Part Two, you will be asked to play the role of an audit senior and make judgments concerning the internal control of an hypothetical client. In Part Three, you will be asked to complete a questionnaire concerning the materials presented to you in Part Two. All three parts together should take approximately 30 minutes to complete.

- Please do not refer back to any pages once you have proceeded to the next page. In addition, please do not record anything except when asked.

- Part One begins on the next page.

PART ONE

- In Part One, you are asked to evaluate the information that follows. The same internal-control information is presented in three different forms: (1) a narrative form, (2) a checklist form, and (3) a grouped form. Please examine this information and evaluate: the strength of the internal-control system; and the form of presentation.

(1) Narrative Form:

- Formal procedures have been established to ensure that sales transactions are properly authorized. In addition, procedures have been established to ensure that sales invoices are prenumbered and adequately controlled. However, formal procedures have not been established to ensure that sales transactions are properly included in the accounts receivable subsidiary records. Formal procedures also have not been established to ensure that sales transactions are recorded on a timely basis. Lastly, the tasks of receiving and prelisting cash have not been adequately separated from the task of performing the accounts receivable function.

(2) Checklist Form:

	<u>Yes</u>	<u>No</u>
- Are formal procedures established to ensure the proper authorization of sales transactions?	X	
- Are formal procedures established to ensure that sales transactions are properly included in the accounts receivable subsidiary records?		X
- Are formal procedures established to ensure that sales transactions are recorded on a timely basis?		X
- Are formal procedures established to ensure that sales invoices are prenumbered and adequately controlled?	X	
- Are the tasks of receiving and prelisting cash adequately separated from the task of performing the accounts receivable function?		X

(3) Grouped Form:

Internal-Control Strengths

- Formal procedures have been established to ensure that sales transactions are properly authorized.
- Formal procedures have been established to ensure that sales invoices are prenumbered and adequately controlled.

Internal-Control Weaknesses

- Formal procedures have not been established to ensure that sales transactions are properly included in the accounts receivable subsidiary records.
- Formal procedures have not been established to ensure that sales transactions are recorded on a timely basis.
- The tasks of receiving and prelisting cash have not been adequately separated from the task of performing the accounts receivable function.

- In general, how would you rate this system of internal control (for the sales and receivables cycle) by comparison with other systems of internal control (also for the sales and receivables cycle) that you have audited? (circle the appropriate number)

Very						Very
Inferior			Average			Superior
1	2	3	4	5	6	7

- Which form of presentation do you think provides the best summarization of the information? (check the appropriate line)

_____ Narrative Form

_____ Checklist Form

_____ Grouped Form

- This completes Part One of this project.

APPENDIX B

MATERIALS FOR SUBJECTS WHO WERE PRIMED FOR THE PPC

Introduction

- Thank you for taking the time to participate in this project. The purpose is to gather information as to how various judgments are made that involve internal control. Specifically, your responses will be used to: (1) further research knowledge; and (2) develop case materials for instructional purposes. The research findings are expected to help in the development of decision aids, which ultimately may be incorporated into the audit program.

- This project consists of three parts. In Part One, you will be asked to evaluate various forms for presenting internal-control information. In Part Two, you will be asked to play the role of an audit senior and make judgments concerning the internal control of an hypothetical client. In Part Three, you will be asked to complete a questionnaire concerning the materials presented to you in Part Two. All three parts together should take approximately 30 minutes to complete.

- Please do not refer back to any pages once you have proceeded to the next page. In addition, please do not record anything except when asked.

- Part One begins on the next page.

PART ONE

- In Part One, you are asked to evaluate the information that follows. The same internal-control information is presented in three different forms: (1) a narrative form, (2) a checklist form, and (3) a grouped form. Please examine this information and evaluate: the strength of the internal-control system; and the form of presentation.

(1) Narrative Form:

- Formal procedures have been established to ensure that purchase transactions are properly authorized. In addition, procedures have been established to ensure that purchase orders are prenumbered and adequately controlled. However, formal procedures have not been established to ensure that purchase transactions are properly included in the accounts payable subsidiary records. Formal procedures also have not been established to ensure that purchase transactions are recorded on a timely basis. Lastly, the task of signing checks and disbursing cash have not been adequately separated from the task of performing the accounts payable function.

(2) Checklist Form:

	<u>Yes</u>	<u>No</u>
- Are formal procedures established to ensure the proper authorization of purchase transactions?	X	
- Are formal procedures established to ensure that purchase transactions are properly included in the accounts payable subsidiary records?		X
- Are formal procedures established to ensure that purchase transactions are recorded on a timely basis?		X
- Are formal procedures established to ensure that purchase orders are prenumbered and adequately controlled?	X	
- Are the tasks of signing checks and disbursing cash adequately separated from the task of performing the accounts payable function?		X

(3) Grouped form:

Internal-Control Strengths

- Formal procedures have been established to ensure that purchase transactions are properly authorized.
- Formal procedures have been established to ensure that purchase orders are prenumbered and adequately controlled.

Internal-Control Weaknesses

- Formal procedures have not been established to ensure that purchase transactions are properly included in the accounts payable subsidiary records.
- Formal procedures have not been established to ensure that purchase transactions are recorded on a timely basis.
- The tasks of signing checks and disbursing cash have not been adequately separated from the task of performing the accounts payable function.

- In general, how would you rate this system of internal control (for the purchases and payables cycle) by comparison with other systems of internal control (also for the purchases and payables cycle) that you have audited? (circle the appropriate number)

Very						Very
Inferior			Average			Superior
1	2	3	4	5	6	7

- Which form of presentation do you think provides the best summarization of the information? (check the appropriate line)

_____ Narrative Form

_____ Checklist Form

_____ Grouped Form

- This completes Part One of this project.

APPENDIX C

MATERIALS FOR SUBJECTS WHO WERE NOT PRIMED

Introduction

- Thank you for taking the time to participate in this project. The purpose is to gather information as to how various judgments are made that involve internal control. Specifically, your responses will be used to: (1) further research knowledge; and (2) develop case materials for instructional purposes. The research findings are expected to help in the development of decision aids, which ultimately may be incorporated into the audit program.

- This project consists of three parts. In Part One, you will be asked to evaluate various forms for presenting internal-control information. In Part Two, you will be asked to play the role of an audit senior and make judgments concerning the internal control of an hypothetical client. In Part Three, you will be asked to complete a questionnaire concerning the materials presented to you in Part Two. All three parts together should take approximately 30 minutes to complete.

- Please do not refer back to any pages once you have proceeded to the next page. In addition, please do not record anything except when asked.

- Part One begins on the next page.

PART ONE

- In Part One, you are asked to evaluate the information that follows. The same internal-control information is presented in three different forms: (1) a narrative form, (2) a checklist form, and (3) a grouped form. Please examine this information and evaluate: the strength of the internal-control system; and the form of presentation.

(1) Narrative Form:

- Formal procedures have been established to ensure that names on the payroll are checked periodically against the active employee file of the personnel department. In addition, procedures have been established for changing names on the payroll, pay rates, and deductions. However, formal procedures have not been established to ensure that time cards are properly approved. Formal procedures also have not been established to ensure that the payroll is audited periodically by internal auditors. Lastly, the tasks of timekeeping and paying employees have not been adequately separated from the task of payroll preparation.

(2) Checklist Form:

	<u>Yes</u>	<u>No</u>
- Are the names on the payroll checked periodically against the active employee file of the personnel department?	X	
- Is the payroll audited periodically by internal auditors?		X
- Are the tasks of both timekeeping and payment of employees adequately separated from the task of payroll preparation?		X
- Are formal procedures established for changing names on the payroll, pay rates, and deductions?	X	
- Are formal procedures established to ensure that time cards are properly approved?		X

(3) Grouped Form:

Internal-Control Strengths

- Formal procedures have been established to ensure that names on the payroll are checked periodically against the active employee file of the personnel department.
- Formal procedures have been established for changing names on the payroll, pay rates, and deductions.

Internal-Control Weaknesses

- Formal procedures have not been established to ensure that time cards are properly approved.
- Formal procedures have not been established to ensure that the payroll is audited periodically by internal auditors.
- The tasks of timekeeping and paying employees have not been adequately separated from the task of payroll preparation.

- In general, how would you rate this system of internal control (for the payroll and personnel cycle) by comparison with other systems of internal control (also for the payroll and personnel cycle) that you have audited? (circle the appropriate number).

Very							Very
Inferior			Average				Superior
1	2	3	4	5	6	7	

- Which form of presentation do you think provides the best summarization of the information? (check the appropriate line)

_____ Narrative Form

_____ Checklist Form

_____ Grouped Form

- This completes Part One of this project.

APPENDIX D

MATERIALS FOR SUBJECTS WHO WERE COMMITTED TO THEIR HYPOTHESES

PART TWO

- In Part Two, you are asked to play the role of an audit senior. You are provided with information on an hypothetical client, named Adams, Inc., and asked to make judgments concerning internal control. The purpose of Part Two is to obtain information as to how these judgments are made.

Information on Adams, Inc.

- Adams, Inc. purchases business machines from several manufacturers and distributes them wholesale. They have been audited by your firm for the past three years and are among the larger of your clients. During this time period, Adams, Inc. has experienced a rapid growth rate; however, their internal accounting controls have not kept pace.
- In particular, Adams, Inc. has had noncompliance problems with several internal controls. These problems have occurred primarily in the sales and receivables cycle and the purchases and payables cycle. Given this past history, your firm has allocated approximately the same number of man hours for the investigation of each of these cycles. Although both cycles have been problem areas, Adams, Inc.'s management has made a concerted effort over the past year to strengthen internal control.
- Assume that Adams, Inc. uses the allowance method to account for uncollectibles and the periodic method to account for inventory.

Audit Plan

- You are informed that a total of 100 man hours has been budgeted for the investigation of Adams, Inc.'s sales and receivables cycle and purchases and payables cycle. Your firm requires you to allocate the total number of budgeted hours between these two cycles. Assume you are aware that your supervisor will only approve one of the following allocations. Indicate which of these allocations you would select to assign a percentage of the total hours (100) to the sales and receivables cycle (SC) and the purchases and payables cycle (PC), respectively. (circle the appropriate number)

65% PC	60% PC	55% PC	50% PC	55% SC	60% SC	65% SC
35% SC	40% SC	45% SC	50% SC	45% PC	40% PC	35% PC
1	2	3	4	5	6	7

Preliminary Investigation of Adams, Inc.

- In your analysis of Adams, Inc.'s permanent file and working papers to date, it has become apparent that gross margin is significantly higher than was expected. A preliminary investigation indicates that the economic conditions surrounding Adams, Inc. have not changed. Given the previous history of noncompliance with certain internal controls, you reach the conclusion that this unexpected fluctuation is likely to be the result of a problem in either the sales and receivables cycle or the purchases and payables cycle.

- Your immediate supervisor has expressed a growing concern over this unexpected fluctuation. As a result, you have been asked to assess the situation. Indicate which of the following cycles you think is the most likely source for the unexpected fluctuation. (check the appropriate line)

_____ Sales and Receivables Cycle

_____ Purchases and Payables Cycle

- How strongly do you feel that the cycle you checked above is the source of the unexpected fluctuation in gross margin? (circle the appropriate number)

Not Very
Strongly

1

2

3

Very Very
Strongly

4

- Please return this booklet to the researcher. In exchange, you will be given a second booklet to complete the remainder of Part Two and all of Part Three.

Compliance-Test Results

- Compliance-test results for Adams, Inc. follow. Nonstatistical sampling was conducted to assess the reliability of internal-control improvements adopted by management. Most of the controls that were tested are for the sales and receivables cycle and the purchases and payables cycle. As such, these results may provide insight into the source of the unexpected fluctuation in gross margin.
- After reading this page, open the large envelope labeled "Other Materials". Inside this envelope you will find ten smaller envelopes. The label on each small envelope describes a specific internal control that was tested: the test results are inside the envelope.
- Please open these smaller envelopes one at a time (in the order you desire), examine the sampling result, return the sampling result to the envelope, and place the envelope face down in the plastic container that has been provided. Please do not refer back to any envelopes once they have been placed in this container. This procedure is intended to represent the sequential nature by which auditors gather evidence.
- After these compliance-test results have been examined, you will be asked to make additional judgments concerning subsequent audit work to be performed.
- Do not proceed to the next page until you have opened the large envelope labeled "Other Materials" and examined the contents of the ten smaller envelopes.

Subsequent Audit Work

- Assume you have been allotted 20 additional hours to search for the source of the unexpected fluctuation in gross margin. These additional hours are now to be allocated between the sales and receivables cycle and the purchases and payables cycle. Again, assume you are aware that your supervisor will only approve one of the following allocations. Indicate which of these allocations you would select to assign a percentage of the additional hours to the sales and receivables cycle (SC) and the purchases and payables cycle (PC), respectively. (circle the appropriate number)

65% PC	60% PC	55% PC	50% PC	55% SC	60% SC	65% SC
35% SC	40% SC	45% SC	50% SC	45% PC	40% PC	35% PC
1	2	3	4	5	6	7

- In general, how would you rate Adams, Inc.'s sales and receivables cycle by comparison with other sales and receivables cycle that you have audited? (circle the appropriate number)

Very Inferior			Average			Very Superior
1	2	3	4	5	6	7

- In general, how would you rate Adams, Inc.'s purchases and payables cycle by comparison with other purchases and payables cycles that you have audited? (circle the appropriate number)

Very Inferior			Average			Very Superior
1	2	3	4	5	6	7

- This completes Part Two of this project.

APPENDIX E

MATERIALS FOR SUBJECTS WHO WERE NOT COMMITTED TO THEIR HYPOTHESES

PART TWO

- In Part Two, you are asked to play the role of an audit senior. You are provided with information on an hypothetical client, named Adams, Inc., and asked to make judgments concerning internal control. The purpose of Part Two is to obtain information as to how these judgments are made.

Information on Adams, Inc.

- Adams, Inc. purchases business machines from several manufacturers and distributes them wholesale. They have been audited by your firm for the past three years and are among the larger of your clients. During this time period, Adams, Inc. has experienced a rapid growth rate; however, their internal accounting controls have not kept pace.
- In particular, Adams, Inc. has had noncompliance problems with several internal controls. These problems have occurred primarily in the sales and receivables cycle and the purchases and payables cycle. Given this past history, your firm has allocated approximately the same number of man hours for the investigation of each of these cycles. Although both cycles have been problem areas, Adams, Inc.'s management has made a concerted effort over the past year to strengthen internal control.
- Assume that Adams, Inc. uses the allowance method to account for uncollectibles and the periodic method to account for inventory.

Audit Plan

- You are informed that a total of 100 man hours has been budgeted for the investigation of Adams, Inc.'s sales and receivables cycle and purchases and payables cycle. Your firm requires you to allocate the total number of budgeted hours between these two cycles. Assume you are aware that your supervisor will only approve one of the following allocations. Indicate which of these allocations you would select to assign a percentage of the total hours (100) to the sales and receivables cycle (SC) and the purchases and payables cycle (PC), respectively. (circle the appropriate number)

65% PC	60% PC	55% PC	50% PC	55% SC	60% SC	65% SC
35% SC	40% SC	45% SC	50% SC	45% PC	40% PC	35% PC
1	2	3	4	5	6	7

Preliminary Investigation of Adams, Inc.

- In your analysis of Adams, Inc.'s permanent file and working papers to date, it has become apparent that gross margin is significantly higher than was expected. A preliminary investigation indicates that the economic conditions surrounding Adams, Inc. have not changed. Given the previous history of noncompliance with certain internal controls, you reach the conclusion that this unexpected fluctuation is likely to be the result of a problem in either the sales and receivables cycle or the purchases and payables cycle.

- Your immediate supervisor has expressed a growing concern over this unexpected fluctuation. As a result, you have been asked to assess the situation. Indicate which of the following cycles you think is the most likely source for the unexpected fluctuation. (check the appropriate line)

_____ Sales and Receivables Cycle

_____ Purchases and Payables Cycle

- How strongly do you feel that the cycle you checked above is the source of the unexpected fluctuation in gross margin? (circle the appropriate number)

Not Very				Very Very
Strongly				Strongly
1	2	3	4	

- Please return this booklet to the researcher. In exchange, you will be given a second booklet to complete the remainder of Part Two and all of Part Three.

Compliance-Test Results

- Compliance-test results for Adams, Inc. follow. Nonstatistical sampling was conducted to assess the reliability of internal-control improvements adopted by management. Most of the controls that were tested are for the sales and receivables cycle and the purchases and payables cycle. As such, these results may provide insight into the source of the unexpected fluctuation in gross margin.
- After reading this page, open the large envelope labeled "Other Materials". Inside this envelope you will find ten smaller envelopes. The label on each small envelope describes a specific internal control that was tested: the test results are inside the envelope.
- Please open these smaller envelopes one at a time (in the order you desire), examine the sampling result, return the sampling result to the envelope, and place the envelope face down in the plastic container that has been provided. Please do not refer back to any envelopes once they have been placed in this container. This procedure is intended to represent the sequential nature by which auditors gather evidence.
- After these compliance-test results have been examined, you will be asked to make additional judgments concerning subsequent audit work to be performed.
- Do not proceed to the next page until you have opened the large envelope labeled "Other Materials" and examined the contents of the ten smaller envelopes.

Subsequent Audit Work

- Assume you have been allotted 20 additional hours to search for the source of the unexpected fluctuation in gross margin. These additional hours are now to be allocated between the sales and receivables cycle and the purchases and payables cycle. Again, assume you are aware that your supervisor will only approve one of the following allocations. Indicate which of these allocations you would select to assign a percentage of the additional hours to the sales and receivables cycle (SC) and the purchases and payables cycle (PC), respectively. (circle the appropriate number)

65% PC	60% PC	55% PC	50% PC	55% SC	60% SC	65% SC
35% SC	40% SC	45% SC	50% SC	45% PC	40% PC	35% PC
1	2	3	4	5	6	7

- In general, how would you rate Adams, Inc.'s sales and receivables cycle by comparison with other sales and receivables cycle that you have audited? (circle the appropriate number)

Very Inferior			Average			Very Superior
1	2	3	4	5	6	7

- In general, how would you rate Adams, Inc.'s purchases and payables cycle by comparison with other purchases and payables cycles that you have audited? (circle the appropriate number)

Very Inferior			Average			Very Superior
1	2	3	4	5	6	7

- This completes Part Two of this project.

APPENDIX F

MATERIALS FOR THE DEBRIEFING QUESTIONNAIRE

PART THREE

Please complete the following questionnaire. These questions are intended to help me understand the differences that I may find between your responses and other auditors.

1. Approximately, how many years of auditing experience have you had?

_____ years

2. Are you a CPA? (check the appropriate line)

_____ yes

_____ no

3. Which of the following statements best characterizes your firm's approach to an audit? (check the appropriate line)

_____ We primarily audit the balance sheet.

_____ We primarily audit the transaction cycles.

_____ We use another approach. (please specify) _____

4. Please indicate how interesting you found Part Two of this project to be. (circle the appropriate number)

Very							Very
Uninteresting							Interesting
1	2	3	4	5	6		7

Questions 5-15 concern the sampling results for Adams, Inc. Answer the questions to the best of your recollection and without referring back to any pages.

5. The sampling results reported exceptions in both the sales and receivables cycle and the purchases and payables cycle. Indicate which of the following statements is true and your level of confidence in your answer. (Check the appropriate line for the true statement, and circle the appropriate number for confidence.)

More exceptions were found in the sales and receivables cycle
 _____ than the purchases and payables cycle.

More exceptions were found in the purchases and payables cycle
 _____ than the sales and receivables cycle.

The same number of exceptions were found in the sales and
 _____ receivables cycle and the purchases and payables cycle.

Extremely Low							Extremely High
Confidence							Confidence
1	2	3	4	5	6		7

For questions 6-15, please indicate (a) the number of exceptions that were found in the compliance-test results and (b) your level of confidence in your answer. Record the number of exceptions in the space provided. For confidence, circle the appropriate number on the right-hand side of this page, where 1 = very low confidence and 7 = very high confidence.

		<u>Level of Confidence</u>						
6.	A sample of sales invoices was examined for proper authorization. Number of exception(s) found = ____.	1	2	3	4	5	6	7
7.	A sample of purchase orders was examined for internal verification to ensure that the terms listed on these orders are the same as those listed on vendors' invoices. Number of exception(s) found = ____.	1	2	3	4	5	6	7
8.	A sample of purchase orders was examined for proper authorization. Number of exception(s) found = ____.	1	2	3	4	5	6	7
9.	A sample of vendors' invoices was examined for internal verification to ensure that purchase transactions are recorded correctly in the purchases journal. Number of exception(s) found = ____.	1	2	3	4	5	6	7
10.	A sequence of sales invoices was examined for prenumbering and adequate control. Number of exception(s) found = ____.	1	2	3	4	5	6	7
11.	A sample of payroll transactions was examined for internal verification to ensure that employees' earnings records are correct. Number of exception(s) found = ____.	1	2	3	4	5	6	7
12.	A sample of time cards was examined to ensure that overtime hours worked are properly authorized. Number of exception(s) found = ____.	1	2	3	4	5	6	7
13.	A sample of shipping reports was examined for internal verification to ensure that the terms listed on these reports are the same as those listed on sales invoices. Number of exception(s) found = ____.	1	2	3	4	5	6	7
14.	A sample of sales invoices was examined for internal verification to ensure that sales transactions are recorded in the sales journal. Number of exception(s) found = ____.	1	2	3	4	5	6	7
15.	A sequence of purchase orders was examined for prenumbering and adequate control. Number of exception(s) found = ____.	1	2	3	4	5	6	7

Questions 16-25 also concern the sampling results for Adams, Inc. Please indicate how important each of the following results could be in producing the unexpected fluctuation in Adams, Inc.'s gross margin. Circle the appropriate number on the right-hand side of this page, where 1 = extremely unimportant and 7 = extremely important.

	<u>Level of Importance</u>						
16. Exceptions in the prenumbering and control of sales invoices.	1	2	3	4	5	6	7
17. Exceptions in the proper authorization of purchase orders.	1	2	3	4	5	6	7
18. Exceptions in the internal verification of shipping reports to ensure that the terms listed on these reports are the same as those listed on sales invoices.	1	2	3	4	5	6	7
19. Exceptions in the internal verification of payroll transactions to ensure that employees' earnings records are correct.	1	2	3	4	5	6	7
20. Exceptions in the prenumbering and control of purchase orders.	1	2	3	4	5	6	7
21. Exceptions in the internal verification of sales invoices to ensure that sales transactions are recorded correctly in the sales journal.	1	2	3	4	5	6	7
22. Exceptions in the proper authorization of overtime hours worked.	1	2	3	4	5	6	7
23. Exceptions in the internal verification of purchase orders to ensure that the terms listed on these orders are the same as those listed on vendors' invoices.	1	2	3	4	5	6	7
24. Exceptions in the proper authorization of sales invoices.	1	2	3	4	5	6	7
25. Exceptions in the internal verification of vendors' invoices to ensure that purchase transactions are recorded correctly in the purchases journal.	1	2	3	4	5	6	7
26. Which of the following cycles do you think the compliance-test results suggest is the most likely source for the unexpected fluctuation in gross margin? (check the appropriate line)							

_____ Sales and Receivables Cycle

_____ Purchases and Payables Cycle

27. How strongly do you feel that the cycle you checked above is the source of the unexpected fluctuation? (circle the appropriate number)

Not Very
Strongly

1

2

3

Very Very
Strongly

4

28. Comparing your second allocation of hours with your first allocation, did you: (check the appropriate line)

_____ Increase the percentage of hours that you assigned to the cycle initially checked as being the most likely source for the unexpected fluctuation.

_____ Decrease the percentage of hours that you assigned to the cycle initially checked as being the most likely source for the unexpected fluctuation.

_____ Not change the percentage of hours that you assigned to the cycle checked as being the most likely source for the unexpected fluctuation.

29. In the space below, please describe why you did or did not change the percentage of hours that you assigned to the cycle initially checked as being the most likely source for the unexpected fluctuation.

30. If you were given an opportunity to allocate the total 120 hours (the 100 originally budgeted plus the 20 additionally allotted) after taking into account all the information that was presented, which of the following would you select to assign a percentage of these hours (120) to the sales and receivables cycle (SC) and the purchases and payables cycle (PC), respectively? (circle the appropriate number).

65% PC	60% PC	55% PC	50% PC	55% SC	60% SC	65% SC
35% SC	40% SC	45% SC	50% SC	45% PC	40% PC	35% PC
1	2	3	4	5	6	7

- I am only interested in aggregate responses, and you may be assured that your responses will be held in strict confidence. Personal responses will not be identified. If you would like to receive the results of this project, please record your name and address in the space below.

Name _____

Mailing
Address _____

- Once again, thank you for your time and cooperation.

APPENDIX G

MATERIALS FOR RECALL QUESTIONS: PREDETERMINED ORDER AND REVERSED ORDER

For questions 6-15, please indicate (a) the number of exceptions that were found in the compliance-test results and (b) your level of confidence in your answer. Record the number of exceptions in the space provided. For confidence, circle the appropriate number on the right-hand side of this page, where 1 = very low confidence and 7 = very high confidence.

		<u>Level of Confidence</u>						
6.	A sequence of purchase orders was examined for prenumbering and adequate control. Number of exception(s) found = ____.	1	2	3	4	5	6	7
7.	A sample of sales invoices was examined for internal verification to ensure that sales transactions are recorded in the sales journal. Number of exception(s) found = ____.	1	2	3	4	5	6	7
8.	A sample of shipping reports was examined for internal verification to ensure that the terms listed on these reports are the same as those listed on sales invoices. Number of exception(s) found = ____.	1	2	3	4	5	6	7
9.	A sample of time cards was examined to ensure that overtime hours worked are properly authorized. Number of exception(s) found = ____.	1	2	3	4	5	6	7
10.	A sample of payroll transactions was examined for internal verification to ensure that employees' earnings records are correct. Number of exception(s) found = ____.	1	2	3	4	5	6	7
11.	A sequence of sales invoices was examined for prenumbering and adequate control. Number of exception(s) found = ____.	1	2	3	4	5	6	7
12.	A sample of vendors' invoices was examined for internal verification to ensure that purchase transactions are recorded correctly in the purchases journal. Number of exception(s) found = ____.	1	2	3	4	5	6	7
13.	A sample of purchase orders was examined for proper authorization. Number of exception(s) found = ____.	1	2	3	4	5	6	7
14.	A sample of purchase orders was examined for internal verification to ensure that the terms listed on these orders are the same as those listed on vendors' invoices. Number of exception(s) found = ____.	1	2	3	4	5	6	7
15.	A sample of sales invoices was examined for proper authorization. Number of exception(s) found = ____.	1	2	3	4	5	6	7

For questions 6-15, please indicate (a) the number of exceptions that were found in the compliance-test results and (b) your level of confidence in your answer. Record the number of exceptions in the space provided. For confidence, circle the appropriate number on the right-hand side of this page, where 1 = very low confidence and 7 = very high confidence.

		<u>Level of Confidence</u>						
6.	A sample of sales invoices was examined for proper authorization. Number of exception(s) found = ____.	1	2	3	4	5	6	7
7.	A sample of purchase orders was examined for internal verification to ensure that the terms listed on these orders are the same as those listed on vendors' invoices. Number of exception(s) found = ____.	1	2	3	4	5	6	7
8.	A sample of purchase orders was examined for proper authorization. Number of exception(s) found = ____.	1	2	3	4	5	6	7
9.	A sample of vendors' invoices was examined for internal verification to ensure that purchase transactions are recorded correctly in the purchases journal. Number of exception(s) found = ____.	1	2	3	4	5	6	7
10.	A sequence of sales invoices was examined for prenumbering and adequate control. Number of exception(s) found = ____.	1	2	3	4	5	6	7
11.	A sample of payroll transactions was examined for internal verification to ensure that employees' earnings records are correct. Number of exception(s) found = ____.	1	2	3	4	5	6	7
12.	A sample of time cards was examined to ensure that overtime hours worked are properly authorized. Number of exception(s) found = ____.	1	2	3	4	5	6	7
13.	A sample of shipping reports was examined for internal verification to ensure that the terms listed on these reports are the same as those listed on sales invoices. Number of exception(s) found = ____.	1	2	3	4	5	6	7
14.	A sample of sales invoices was examined for internal verification to ensure that sales transactions are recorded in the sales journal. Number of exception(s) found = ____.	1	2	3	4	5	6	7
15.	A sequence of purchase orders was examined for prenumbering and adequate control. Number of exception(s) found = ____.	1	2	3	4	5	6	7

APPENDIX H

MATERIALS FOR IMPORTANCE QUESTIONS: PREDETERMINED ORDER
AND REVERSED ORDER

Questions 16-25 also concern the sampling results for Adams, Inc. Please indicate how important each of the following results could be in producing the unexpected fluctuation in Adams, Inc.'s gross margin. Circle the appropriate number on the right-hand side of this page, where 1 = extremely unimportant and 7 = extremely important.

- | | <u>Level of Importance</u> | | | | | | |
|--|----------------------------|---|---|---|---|---|---|
| 16. Exceptions in the internal verification of vendors' invoices to ensure that purchase transactions are recorded correctly in the purchases journal. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 17. Exceptions in the proper authorization of sales invoices. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 18. Exceptions in the internal verification of purchase orders to ensure that the terms listed on these orders are the same as those listed on vendors' invoices. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 19. Exceptions in the proper authorization of overtime hours worked. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 20. Exceptions in the internal verification of sales invoices to ensure that sales transactions are recorded correctly in the sales journal. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 21. Exceptions in the prenumbering and control of purchase orders. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 22. Exceptions in the internal verification of payroll transactions to ensure that employees' earnings records are correct. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 23. Exceptions in the internal verification of shipping reports to ensure that the terms listed on these reports are the same as those listed on sales invoices. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 24. Exceptions in the proper authorization of purchase orders. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 25. Exceptions in the prenumbering and control of sales invoices. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 26. Which of the following cycles do you think the compliance-test results suggest is the most likely source for the unexpected fluctuation in gross margin?
(check the appropriate line) | | | | | | | |

_____ Sales and Receivables Cycle

_____ Purchases and Payables Cycle

27. How strongly do you feel that the cycle you checked above is the source of the unexpected fluctuation? (circle the appropriate number)

Not Very
Strongly
1

2

3

Very Very
Strongly
4

Questions 16-25 also concern the sampling results for Adams, Inc. Please indicate how important each of the following results could be in producing the unexpected fluctuation in Adams, Inc.'s gross margin. Circle the appropriate number on the right-hand side of this page, where 1 = extremely unimportant and 7 = extremely important.

- | | <u>Level of Importance</u> |
|---|----------------------------|
| 16. Exceptions in the prenumbering and control of sales invoices. | 1 2 3 4 5 6 7 |
| 17. Exceptions in the proper authorization of purchase orders. | 1 2 3 4 5 6 7 |
| 18. Exceptions in the internal verification of shipping reports to ensure that the terms listed on these reports are the same as those listed on sales invoices. | 1 2 3 4 5 6 7 |
| 19. Exceptions in the internal verification of payroll transactions to ensure that employees' earnings records are correct. | 1 2 3 4 5 6 7 |
| 20. Exceptions in the prenumbering and control of purchase orders. | 1 2 3 4 5 6 7 |
| 21. Exceptions in the internal verification of sales invoices to ensure that sales transactions are recorded correctly in the sales journal. | 1 2 3 4 5 6 7 |
| 22. Exceptions in the proper authorization of overtime hours worked. | 1 2 3 4 5 6 7 |
| 23. Exceptions in the internal verification of purchase orders to ensure that the terms listed on these orders are the same as those listed on vendors' invoices. | 1 2 3 4 5 6 7 |
| 24. Exceptions in the proper authorization of sales invoices. | 1 2 3 4 5 6 7 |
| 25. Exceptions in the internal verification of vendors' invoices to ensure that purchase transactions are recorded correctly in the purchases journal. | 1 2 3 4 5 6 7 |
| 26. Which of the following cycles do you think the compliance-test results suggest is the most likely source for the unexpected fluctuation in gross margin? (check the appropriate line) | |
| _____ Sales and Receivables Cycle | |
| _____ Purchases and Payables Cycle | |
| 27. How strongly do you feel that the cycle you checked above <u>is</u> the source of the unexpected fluctuation? (circle the appropriate number) | |

Not Very
Strongly
1

2

3

Very Very
Strongly
4

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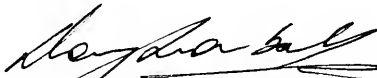
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BIOGRAPHICAL SKETCH

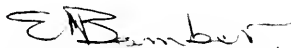
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I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.




Douglas Snowball, Chairman
Professor of Accounting

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.



E. Michael Bamber
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I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.



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This dissertation was submitted to the Graduate Faculty of the School of Accounting in the College of Business Administration and to the Graduate School and was accepted as partial fulfillment of the requirements for the degree of Doctor of Philosophy.

December 1986

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